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Note.—Initialled abstracts are written by the following:—

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* General studies, see also individual crops.

Plant Breeding Abstracts.

Vol. XIV, No. 2.

Part I. Empire Section

STATISTICS 519

363. FISHER, R. A., CORBET, A. S. and WILLIAMS, C. B. 519.24:581.5

The relation between the number of species and the number of individuals in a random sample of an animal population.

J. Anim. Ecol. 1943 : **12** : 42–58.

The following relations have been derived between the number of individuals in an animal population (N) and the number of species (S):—

$$N = \frac{n_1}{1-x} \text{ and } S = n_1 \frac{-\log_e (1-x)}{x}$$

where x is a constant and n_1 the number of species represented by single specimens. When N is large, n_1 tends to become a constant value α where $x = \frac{N}{N+\alpha}$. It is suggested that the parameter α should be called the index of diversity and it is found to vary seasonally and with the location of the sampling apparatus (a light trap).

364. NAIR, K. R. and RAO, C. R. 519.271.3

A general class of quasi-factorial designs leading to confounded designs for factorial experiments.

Sci. and Cult. 1942 : **7** : 457–58.

This letter is a preliminary notice concerning incomplete block designs belonging to the system of Bose and Nair. Some remarks are made on the loss of information on each degree of freedom of the main effects and of the interactions. S. N. C.

BREEDING 575

365. 575:633(410+417)

Crops and plant breeding.

J.R. Agric. Soc. 1943 : **104** : 8–17.

This paper includes a discussion on the merits of recently introduced varieties of the following crops: forage grasses, wheat, barley, oats, maize, linseed and flax, sweet lupins, potatoes, sugar beet and mangolds.

366. 575:633(54)

Plant breeding in relation to food production.

Curr. Sci. 1943 : **12** : 239–43.

The author shows that the more general adoption of improved varieties would be a most important contribution to the problem of greater food production in India. After reviewing the present situation, various improvements are suggested and the need for more highly-qualified plant breeders is stressed.

367. 575:633(54.3)

Annual administration report of the Department of Agriculture, United Provinces, for the year ending 30th June, 1942.

Allahabad 1943 : Pp. 52.

Wheat

Locally adapted soft wheat varieties are being bred.

Maize

Early and late maturing strains are being selected.

Millet
Promising selections have been made from the bajrà varieties C11, C16 and Baroda.

Oil plants
Superior strains have been obtained by selection from the linseed varieties C.1150 and C.1193; high-yielding medium and small seeded forms have also been produced. Selection has continued with castor and til.

Sugar cane
Varietal tests are reported.

Cotton
Efforts are being made to improve desi cotton and hybridization is being followed up between C.520 and C.402, on the one hand, and Bani, Gaorani Shan and Million Dollar, on the other.

Sunn hemp
Six strains exhibiting superior fibre and seed yields have been obtained by selection from C.12.

Pulse
Arhar is being bred for wilt resistance.

Gram
Promising crosses are reported.

368. 575:633(71)

Report of the Minister of Agriculture for the Dominion of Canada for the year ended March 31, 1943 : Pp. 155.

Wheat
Eighteen rust resistant selections have been obtained from the cross Br. 44.7 x Thatcher; they are early maturing and yield better than the latter parent. Thirteen amphidiploid families have been obtained by crossing wheat varieties with *Agropyron glaucum*, all of which exhibit stable agronomic characters.

Oats
Brighton is a new smut-resistant hull-less variety and Ajax and Exeter are rust resistant types adapted to certain regions in Canada. Ajax is earlier than Vanguard and has stronger straw.

Maize
Several high yielding double-cross hybrids have been produced which combine early maturity with suitability for Ottawa conditions.

Lucerne
Breeding for resistance to crown rot is in progress and several inbred lines have been selected on account of their high percentage seed sets.

White Clover
An improved strain has been developed from indigenous material growing in the vicinity of Nappan, N.S.

Red Clover
A polyploid strain of Ottawa, characterized by the large size of its vegetative parts, has been obtained by colchicine treatment.

Red Fescue
A new variety, Duraturf, is reported.

Potato
Many blight resistant seedlings have been obtained from crosses between *Solanum tuberosum* and *S. demissum*. Resistance to mild mosaic has been found in 61 hybrids of *S. tuberosum* and other seedlings have been raised resistant to late blight and leaf-roll; one seedling resistant to *Myzus persicae* has been detected. Katahdin exhibits resistance to mild mosaic but not to rugose mosaic. Varietal differences in susceptibility to aphid injury have been investigated.

Tobacco
Early maturing strains have been developed from the following varieties: Yellow Mammoth, White Mammoth, Bonanza and Virginia Bright. Haronova is a new variety derived from Harrow Velvet x Standup. It is resistant to black root-rot and has leaves with more body than Harrow Velvet.

Rubber
Asclepias syriaca is one of the more promising native Canadian rubber plants and it has also been suggested as a kapok substitute. *Taraxacum kok-saghyz* has varied much in rubber content, the values reported ranging from 1% to 13%.

Apples
Three promising hybrids are reported which combine the quality of Melba with the early maturation of Crimson Beauty.

Sand cherry
Dura and Morden 123 are two new varieties derived from cross-pollinating Sapa. They are hardier and have larger fruit than the latter variety.

Sunflower
Increased yields have been obtained by hybridization.

Tomato
Resistance to bacterial canker has been found in *Lycopersicon peruvianum* and *L. peruvianum* var. *humifusum*.

Celery
The varieties Cornell F.6. 10–10 and Cornell 19 combine resistance both to blackheart and to fusarium yellows.

369. 575:633(71.24)
Report of the acting president, University of Saskatchewan, for the academic year 1942–43.
Saskatoon 1943 : Pp. 79.

The following items relate to plant breeding:—

Wheat
Promising lines have been produced from Thatcher x Apex, Comet x Thatcher and Comet x Apex. Work on the artificial synthesis of *Triticum vulgare* is nearly completed.

Oats
New smut and rust resistant lines are being tested.

Barley
Lines have been obtained exhibiting resistance to stem rust, smooth awns, high yields and strong straw. The development and abortion of the embryos in barley-rye crosses has been investigated.

Crested wheat grass
A successful hybridization technique has been elaborated for this species. Selection for yield and leafiness continues.

Lucerne
Breeding continues.

Sweet clover
Improvement is being effected by concentrating on the following characters: coumarin content, testa permeability, alkali tolerance and seed weight.

Linseed
Efforts are being made to produce a variety combining earliness and high quality oil with the desirable characteristics of Royal.

Sunflower
Inbreeding, hybridization and selection is in progress.

370. HOLTHORP, H. E. 575.22:575.11
Tricotyledony.
Nature, Lond. 1944 : **153** : 13–14.

Evidence is presented to support the view that the production of three cotyledons, a sporadic abnormality in many species, is under genetic control. The various types of tricotyledony are described and discussed.

371. STEDMAN, E. and STEDMAN, E. 576.312:576.353
Probable function of histone as a regulator of mitosis.
Nature, Lond. 1943 : **152** : 556–57.

The authors find that the histone content of frequently dividing cells is lower than that of resting cells. To account for this observation, it is suggested that histone acts as an inhibitor of mitosis by combining with nucleic acid. In order for mitosis to occur, it is postulated that the nucleic acid should be free to combine with chromosomin, the compound formed having self-propagating properties which result in spindle formation and cell division.

372. BARBER, H. N. and CALLAN, H. G. 576.312:581.192
Distribution of nucleic acid in the cell.
Nature, Lond. 1944 : **153** : p. 109.

The hypothesis of nucleic acid distribution introduced by Stedman and Stedman (see "Plant Breeding Abstracts", Vol. XIV, Absts 17, 18, 19) is criticized. It is believed that sufficient evidence may be adduced to support the theory that nucleic acid is a major component of the chromosomes. Also, the tentative suggestion that the spindle may be composed of a nucleic acid gel is thought to be at variance with the known optical properties of the spindle.

373. GULLAND, J. M., BARKER, G. R. and JORDAN, D. O. 576.312.32:581.192
Structure of nucleic acid in the dividing cell.
Nature, Lond. 1944 : **153** : p. 20.

The hypothesis of chromosome structure and division suggested by Donovan and Woodhouse is criticized. It is believed that the formation and subsequent fission of a symmetrical double nucleic acid, the nucleotides of which are mirror images of each other, is unlikely and that such a suggestion rests on insufficient evidence and over-simplifies the known facts.

375. MANTON, I. and SMILES, J. 576.312.34:578.08
Observations on the spiral structure of somatic chromosomes in *Osmunda* with the aid of ultraviolet light.
Ann. Bot., Lond. 1943 : **7** : 195–212.

A technique for examining the spiral structure of somatic chromosomes by means of ultraviolet light is described. Young prothalli of *O. regalis* were examined and it was observed that there were twice as many coils in a particular chromosome at mitosis as there were at meiosis II. It was also found "(i) that right and left-handed coiling can occur in the same nucleus; (ii) that homologous parts of sister chromatids may be coiled in the same or in opposite directions; (iii) that changes of direction can occur along the length of a chromosome and may involve both chromatids at the same point or may affect one only."

375. WHITE, M. J. D. 576.312.341
Amount of heterochromatin as a specific character.
Nature, Lond. 1943 : **152** : 536–37.

This paper contains a general discussion on the importance of heterochromatin as a specific character. The terms "megaheterochromatic" and "microheterochromatic" are proposed to cover species or individuals which differ from their groups in having more or less heterochromatin respectively.

376. WHITEHOUSE, H. L. K. 576.35:575.1
A brief account of the fundamentals of genetics.
Sch. Sci. Rev. 1943 : No. 95 : 77–90.

An elementary account of the cytological processes determining genetical behaviour is presented. Mitosis, meiosis and sex determination are described and the final sections deal with linkage.

377. THOMAS, P. T. and DREW, R. 576.353:581.04:576.356.5
Chemical control of mitosis.
Nature, Lond. 1943 : **152** : 564–65.

Ethyl mercuric chloride has been found effective in inducing c-mitosis and polyploidy. Used

alone, its efficiency in this respect is only slight but in conjunction with 1 : 2 : 5 : 6-dibenzanthracene its effect is pronounced. This example of complementary action by two substances may have important theoretical and practical consequences.

MICROSCOPIC TECHNIQUE 578.6

378. BURCH, C. R. and STOCK, J. P. P. 578.6
Phase-contrast microscopy.
J. Sci. Instrum. 1942 : **19** : No. 5 : 71–75.

The technique of phase-contrast microscopy introduced by Zernike is described. By means of appropriate illumination, slight non-homogeneities in the refractive index of the medium under examination can be rendered visible as apparent variations in transparency.

FUNGI 632.4

379. THAYSEN, A. C. and MORRIS, M. 632.422.3:581.04
Preparation of a giant strain of *Torulopsis utilis*.
Nature, Lond. 1943 : **152** : 526–28.

It has been found possible to double the cell size of *T. utilis* by means of camphor, the resulting strain being named var. *major*. Colchicine and α-naphthylamine were of no use in this respect but borneol or bornyl acetate were effective.

380. VEITCH, R. et al. 633(94.3)
Farm crops and pastures.
Qd Agric. Past. Handb. 1941: **1**: Pp. 448.

This book includes a description of the principal varieties suitable for Queensland of the following agricultural crops: wheat, maize, sorghums, cotton, tobacco, root crops, pumpkins and squashes, lucerne, peanuts and other legumes, and miscellaneous forage crops and pasture species. One chapter indicates the value of improved varieties and gives a general description of the methods of the plant breeder.

ECONOMIC PLANTS 633

381. HASKELL, G. 633:581.162.32
Spatial isolation of seed crops.
Nature, Lond. 1943 : **152** : 591–92.

The information available on the maximum cross-pollination distances of some of the commoner economic crops is summarized.

WHEAT 633.11

382. KRISHNA IYER, P. V. and AZIZUDDIN AHMAD, S. 633.11:519.271.3
Efficiency of some sampling methods for wheat crop.
Curr. Sci. 1943 : **12** : 258–59.

Three methods of sampling wheat crops are described and their comparative efficiencies analysed.

383. MACINDOE, S. L. 633.11:575
Science and a better way of life for farmers.
J. Aust. Inst. Agric. Sci. 1943 : **9** : 115–21.

This paper includes a brief account of the wheat breeding achievements of Carleton, Saunders, Farrer and Hayes.

384. 633.11:575.127.5:576.312.32
S...., B. C. 633.11:575.129:633.11*Aegilops*
A synthesis of a 42-chromosome wheat.
Nature, Lond. 1943 : **152** : 575–76.

It is suggested that the amphidiploid hybrid of *Triticum turgidum* x *Aegilops speltoides* may have the constitution $AABBA^1A^1$ rather than the AABBCC of *T. vulgare*. The author doubts whether *Ae. speltoides* contains the C chromosome sets, both on account of the bivalent formation in its interspecific crosses with *Triticum* spp., and from the fact that it possesses four nucleoli.

385. Love, R. M. 633.11:576.356.2:575.24:575.17
A cytogenetic study of offtypes in a winter wheat, Dawson's Golden Chaff, including a white chaff mutant.
Canad. J. Res. 1943 : **21** : Sect. C : 257–64.

A white chaff mutant of Dawson's Golden Chaff is described. In addition to its pigmentation difference, it is shorter than the parent and has longer glumes. A telokinetic bivalent is found at meiosis.

The parent variety was derived originally from the white chaff variety Lancaster and the hypothesis is proposed that the former differs from the latter not so much through gene substitution as by the addition of masking genes which inhibit the normal expression of the original gene complex which however remains unaltered. It is suggested that the white chaff mutant is deficient for a chromosome arm that contains genes masking and modifying the original gene complex which determined white chaff colour, plant size, and glume length. In this way, the mutant may be regarded as an atavistic reversion to the variety Lancaster, some of the masking genes of Dawson's Golden Chaff having been removed. Cytological investigations on other lines of the latter variety have established the probability that telokinetic bivalents may arise from the misdivision and fragmentation of the primary or secondary univalents found in the monosomic plants of the original variety. It is not possible to rogue the monosomics as they are phenotypically indistinguishable from the normal type.

386. Anderson, J. A. and
Eva, W. J. 633.11:581.6:519.241.1(71)
Starch content of western Canadian wheat. II. Its estimation from protein content, and some estimated data.
Canad. J. Res. 1943 : **21** : Sect. C. : 323–31.

From the analysis of the protein and starch contents of some Canadian wheats, an inverse correlation is obtained between these two factors. The correlation is particularly high with the higher grades of wheat and is used to estimate the starch content of wheats over a 16-year period from the protein content. A lower and less reliable correlation is obtained with Canadian No. 5 wheat.

387. Anderson, J. A. and
Cunningham, R. L. 633.11:581.6:578.08
Micro tests of alimentary pastes. III. The differential response of varieties to processing methods.
Canad. J. Res. 1943 : **21** : Sect. C : 265–75.

The difficulties attending the standardization of methods for assaying the quality of *durum* wheats are considered. It is shown that the quality of the varieties of *T. durum* is classified differently according to the technique used.

388. McCalla, A. G. and 633.11:581.6:581.02
Corns, W. G. 633.16:581.6:581.02
Effects of variety and environment on the starch content of wheat and barley.
Canad. J. Res. 1943 : **21** : Sect. C : 307–21.

The starch and protein contents of wheat and barley varieties have been investigated. With both these crops, the environment exerts the major determining influence on the starch content but varietial differences are also significant. Correlation coefficients as high as $r = -0{\cdot}970$ were established between starch and protein content. Calculation of regression coefficients showed that for every decrease of 1% in protein content, there was an increase of considerably more than 1% in starch content.

389. Pugsley, A. T. and
Phipps, I. F. 633.11-2.452:576.16:631.521.6:575.11
The combination of stem rust resistant genes from the wheats Eureka and Warigo.
J. Aust. Inst. Agric. Sci. 1943 : **9** : 130–32.

Seedlings of the variety Eureka are resistant at low temperature to race 34 of *Puccinia graminis*

Tritici, one gene being concerned. Warigo is susceptible in the seedling stage but resistant when mature, and in this case several genes are operative. When these two varieties are crossed, a unifactorial segregation for seedling resistance and a bifactorial segregation for mature plant resistance are observed. Lines carrying both resistance factors have been established by selecting families heterozygous for seedling susceptibility and homozygous for mature plant resistance, and then further selecting this stock for seedling resistance. The family obtained (6543) is being crossed with Bobin x Gaza x Bobin, which possesses a gene determining resistance to race 34 at high temperatures.

390. 633.11-2.452-1.521.6:575.12:632.7

A valuable new wheat.

Corn Tr. News 1943 : **168** : p. 233.

The Canadian breeding programme initiated in order to obtain wheat varieties resistant to saw-fly is described. Two solid stem varieties obtained from Portugal via New Zealand were hybridized with high quality Canadian wheats and the resulting lines crossed with the rust resistant varieties Thatcher, Renown and Apex. A variety has been obtained finally which has suitable quality and combines resistance to saw-fly and rust.

391. Greaney, F. J. and
Wallace, H. A. H. 633.11-2.484-1.521.6(71)

Varietal susceptibility to kernel smudge in wheat.

Sci. Agric. 1943 : **24** : 126–34.

The reaction of a number of wheat varieties to kernel smudge caused by species of *Alternaria* and *Helminthosporium sativum* was tested at several stations in Western Canada from 1935 to 1942. In general, varieties of *Triticum durum* were more susceptible than were varieties of *T. vulgare*. The commonly grown varieties of hard red spring wheat tested, ranked in order of decreasing susceptibility as follows: Apex, Thatcher, Marquis, Renown, Regent and Garnet. Garnet, an early variety, was highly resistant. In all years, the percentage of kernels infected internally with these fungi was appreciably higher than the percentage of kernels showing typical external symptoms of smudge.

OATS 633.13

392. 633.13-2.7-1.521.6:575.12(42.59)

Sandford oat.

Nat. Inst. Agric. Bot. Cambridge, January 1944 : Pp. 3.

This new variety is a selection from a cross between Star and a Swedish variety "Spet"*. It is resistant to attack by the frit-fly, and tillers more freely than Victory but has a smaller panicle. The straw is short, fine and markedly resilient, giving resistance to lodging. The grain is white and somewhat longer than Victory with a similar percentage of husk, and under similar conditions ripens about three days earlier. It is recommended for late sowings, and is able to stand up to adverse cultural conditions.

BARLEY 633.16

393. 633.16:581.6:575(42)
Hunter, H. 633.16:575.127.2

The improvement of malting barleys, in retrospect and prospect.

J. Inst. Brew. 1943 : **49** : 296–302.

The history of malting barley breeding during the present century is reviewed and the origin of Spratt-Archer and Plumage-Archer described. Pioneer is a recently produced barley, derived from Tschermak's two-row winter barley x Spratt-Archer; it is suitable for autumn sowing. Kenia and Maja, two Danish varieties, have been used in breeding experiments on account of their resistance to lodging and other desirable characters.

Camton, a feeding barley suitable for the Cambridge fenland, was derived from the F_2 of Spratt x Archer-Goldthorpe and it is hoped that the yields of this variety might be improved by crossing with a *Hordeum deficiens* hybrid.

Although, as a working hypothesis, the total nitrogen content of the grain is taken as being inversely related to malting quality, it is shown that exceptions to this rule occur.

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* [Spets?]

MILLETS AND SORGHUM 633.17

394. CLYDESDALE, C. S. 633.174:576.16
Field crops. Grain sorghums.
Qd Agric. J. 1943 : **57** : 133–41.

This article includes a short account of grain sorghum varieties.

RICE 633.18

395. DAVE, B. B. 633.18:575.061.6:575.12
The wild rice problem in the Central Provinces and its solution.
Indian J. Agric. Sci. 1943 : **13** : 46–53.

Wild rice, which infests fields of cultivated rice to an extent varying from 3 to 30 %, causes a considerable annual loss. To facilitate the eradication of this weed in the early stages of growth, crosses were made between the purple-auricled variety Parewa and the fully-purple variety Nagkesar on the one hand, and several commercially important varieties on the other, in order to transfer the distinctive pigmentation factors of the first two varieties to the latter. This object has been fulfilled by the production of the Strains: No. 1, No. 2, No. 5, No. 19 and No. 116. Detailed descriptions of the strains are given. B. P. P.

396. 633.18:575.42(54.8)
Administration report of the Agricultural Department, Travancore. 1943 : Pp. 39.

The following local rice varieties are being selected:Kallada Samba, Chettiviruppu and Kari Vennel. It is hoped that types will be discovered well adapted to acid or saline conditions.

FORAGE GRASSES 633.2

397. JENKIN, T. J. 633.2/3:575(42.9)
Aberystwyth strains of grasses and clovers.
J. Minist. Agric. 1943 : **50** : 343–49.

The methods of breeding improved strains of forage crops are shortly described. It is pointed out that the various types introduced are not genetically uniform and that they may contain mixtures of varieties derived from many different localities. Also, the composition of the complex may not remain constant as inferior components are often discarded in favour of new superior strains.
Details are given next of the origin and character of the following strains: perennial ryegrass, S.23, S.24 and S.101; cocksfoot, S.26, S.37 and S.143; timothy, S.48, S.50 and S.51; meadow fescue, S.53; creeping red fescue, S.59; red clover S.123 and S.151; and white clover, S.100 and S.184.

398. CLARIDGE, J. H. 633.263:576.16:001.4
"Hl ryegrass"—short rotation ryegrass renamed.
N.Z. J. Agric. 1943 : **67** : p. 286.

The recently introduced short rotation ryegrass has been renamed as H1 ryegrass.

399. EDWARDS, D. C. 633.287:576.16(67.6)
The Nzoia type of Rhodes grass (*Chloris gayana*) for temporary leys.
E. Afr. Agric. J. 1943 : **9** : 62–68.

Comparative trials have established the superiority of the Nzoia ecotype of Rhodes grass for temporary leys.

LEGUMINOUS FORAGE PLANTS 633.3

400. SEXSMITH, J. J. and
FRYER, J. R. 633.31:581.331.2
Studies relating to fertility in alfalfa (*Medicago sativa* L.). I. Pollen viability as affected by seasonal age of the plant.
Sci. Agric. 1943 : **24** : 95–100.

There is no significant seasonal difference in pollen viability in any one alfalfa plant, though differences between plants are well marked. The author concludes that seasonal variations in pod setting are not due to changes in pollen viability.

401. Sexsmith, J. J. and Fryer, J. R. 633.31:581.331.23:581.036
Studies relating to fertility in alfalfa (*Medicago sativa* L.). II. Temperature effect on pollen tube growth.
Sci. Agric. 1943 : **24** : 145–51.
A linear relationship was found to exist between pollen tube growth and temperature, the length attained in half-an-hour increasing as the temperature increased from 70° to 100° F. The pollen tubes formed at 100° F. were normal in appearance with no irregularities such as have been described for other species at this temperature. A temperature of 50° F. was not sufficient to cause germination in half-an-hour, although a slight bulging at the germ pores could be seen.

ROOTS AND TUBERS 633.4

402. 633.491:575(93.1)
Plant recording. Potato "Dominion", raised by James Flemming, "Sunny Mount" Ohakune Junction.
J. Roy. N.Z. Inst. Hort. 1943 : **13** : p. 10.
A new late potato variety, Dominion, is reported. It is a natural seedling, probably from Majestic, and is characterized by vigorous stems, white flowers, tall haulms, heavy cropping and oblong tubers with shallow eyes. Up to the present it has shown no signs of blight.

403. Choudhuri, H. C. 633.491:576.312.38:576.356.5
Cytological studies in the genus *Solanum*. I. Wild and native cultivated "diploid" potatoes.
Trans. Roy. Soc. Edinb. 1943 : **61** : 113–35.
The statistical analysis of secondary pairing of chromosomes at meiosis in six "diploid" species of *Solanum* (*S. lanciforme, S. Parodii, S. infundibuliforme, S. stenotomum, S. Rybinii* and *S. polyadenium*) is taken as indicating that the primary basic number in this group is 6.
The author considers that the cytological investigation of "diploid" potatoes dealt with in the paper shows that there is good evidence for regarding them as of hybrid origin.
The species concerned are all heterozygous for one or two inversions. It is suggested that the inversion bridges along with other irregularities contribute partially, if not wholly, to male sterility. J. G. H.

404. Salaman, R. N. 633.491-2-1.521.6:631.524:575
Recent research in potato breeding.
Emp. J. Exp. Agric. 1943 : **11** : 125–39.
The writer reviews the progress made during the present century in potato breeding. Following this account, a table is presented listing the sources of breeding material (principally wild species of *Solanum*) which show promise for breeding to meet various physiological requirements and to withstand diseases.

405. 633.491-2.411·4:576.16:631.521.6:575.127.2
Black, W. 633.491:576.356.5:575.129
Inheritance of resistance to two strains of blight (*Phytophthora infestans* de Bary) in potatoes.
Trans. Roy. Soc. Edinb. 1942–1943 : **61** : 137–47.
A method of producing fertile blight resistant hybrids between *Solanum demissum* ($2n = 72$) and *S. tuberosum* ($2n = 48$) is described, involving the use of a "bridge" species, *S. Rybinii* ($2n = 24$). A cross was effected between *S. Rybinii* and *S. demissum*, using the former as female parent; from this cross one seed was obtained which grew into a plant with 48 somatic chromosomes (12 from the female and 36 from the male parent). This was then crossed with *S. tuberosum*, the triple hybrids thus produced being perfectly fertile. When crossed with *S. tuberosum* they could be used as either male or female parent and their utilization has helped to overcome the sterility handicap in potato breeding for blight resistance.
The common strain of blight (A) and a more virulent one (B) were tested on several generations of the above mentioned hybrids as well as on ordinary *S. demissum* x *S. tuberosum* hybrids. The data obtained lead the author to suggest that the resistance to the two blight strains is controlled by two genes of different phylogenetic origins, which he names *Ra* and *Rb* respectively,

the former conferring resistance to the A strain and the latter to both strains. An increased concentration of *Ra* genes does not, however, confer resistance to the B strain of blight.
In the view of the author the results obtained agree with the theory that the basic chromosome number in *Solanum* is 6. On this view *S. Rybinii* would be an allotetraploid, *S. tuberosum* an allo-octoploid and *S. demissum* an allododecaploid. J. G. H.

FIBRES 633.5

406. Hutchinson, J. B. and
Manning, H. L. 633.51:519.24:575.22
The efficiency of progeny-row-breeding in cotton improvement.
Emp. J. Exp. Agric. 1943 : **11** : 140–54.

The breeding histories of the two cotton varieties, superfine Sea Island V135 and U4, are described. An analysis of the information bearing on these varieties supports the view that the capacity to respond to selection is a function of the genetic variance of the material.
Advantages of progeny-row breeding over mass selection are then considered with special reference to the problem of conserving genetic variability. It is pointed out that analysis of breeding material should be made at intervals in order to assess the progress made in the breeding projects under consideration.

407. Nowell, W. 633.51:575
A review of the work of the Experiment Stations, seasons 1939-40 to 1941-42.
Emp. Cott. Gr. Corp. Lond. 1943 : Pp. 30.

A review is given of the work of each experiment station for a three year period. The yearly reports have already been reviewed in "Plant Breeding Abstracts", Vol. XI, Abst. 867, and Vol. XIII, Abst. 1059).

408. Peters, R. W. 633.51:575(94.3)
Cotton culture. Cotton breeding.
Qd Agric. J. 1943 : **57** : 142–46.

The various improvements desired by Queensland cotton breeders are outlined and an account follows of the methods of mass selection, individual plant selection and hybridization.

409. 633.51:576.354.4:576.356.5:581.04:575.127.2
Stephens, S. G. 633.51:576.16
Meiosis of a triple species hybrid in *Gossypium*.
Nature, Lond. 1944 : **153** : 82–83.

An autotetraploid specimen of *G. arboreum* (genome AAAA) has been crossed with *G. Sturtii* (CC) and a triploid (AAC) produced. The latter was treated with colchicine and the pollen of the resultant flowers applied to *G. barbadense* (AADD). One completely sterile 52-chromosome hybrid was obtained which is believed to have received the AC genome from the pollen parent. Its chromosome complement is therefore presumed to be AACD. At meiosis, the hybrid exhibited an average of 11·8 ± 0·8 univalents per pollen mother-cell and it is concluded that the A genomes pair but that a very low degree of association exists between the C and D genomes. This result would suggest that *G. Sturtii* is not the American ancestor of the New World tetraploid cottons.

410. Stephens, S. G. 633.51:581.143:575.11:575.129
Phenogenetic evidence for the amphidiploid origin of New World cottons.
Nature, Lond. 1944 : **153** : 53–54.

The possible phylogenetic origin of American tetraploid cottons is discussed. It has been found that the leaf morphology and "developmental tracks" of the F_1 hybrids, *G. arboreum* x *G. Raimondii* and *G. herbaceum* x *G. Raimondii*, correspond closely to those of tetraploid American types. Consequently, the author suggests that the latter forms have probably arisen by the chromosome doubling of crosses between diploid American and Asiatic species. In this case, the genes L^{E} and *l* of the tetraploid forms would be identical with the gene complexes $L^{\text{A}} + X$ and *"l"* + *X* respectively, where L^{A} and *"l"* are the alleles of the Asiatic species and *X* a presumed entire leaf gene of the diploid American ancestor. General morphological considerations indicate that either *G. Klotzschianum* or *G. Raimondii* might produce hybrids resembling the present-day tetraploid cottons.

411. MARRIOTT, S. 633.51-2.7-1.521.6:575.12(94.3)
Breeding jassid-resistant cotton varieties.
Qd. Agric. J. 1943 : **57** : 204–06.

In breeding for resistance to jassid attack, three main systems were used, namely, individual and mass selection, and hybridization. It was found that there was some correlation between hairiness and resistance, though not all hairy plants were resistant; furthermore, under certain conditions, even the normally susceptible glabrous plants withstood attack.

From mass selection, the rather heterogeneous strain known as 41 J has been produced; this does not show more than a 20% increase in jassid resistance over the original non-selected strain.

From individual selection methods the very uniform Miller strain 111–26 was derived. It has been reported to be of excellent quality, with a $\frac{15}{16}$–1in. staple length. It bears only a medium sized boll, however, and produces a rather leafy type of plant. Other selections from Miller also show promise.

Hybridizing imported resistant types, such as the South African U4, that are useless under Queensland conditions, with some of the Queensland cottons such as Miller, and subsequently back-crossing for several generations to Miller, has produced promising lines. Their production has, however, not yet reached a commercial scale.

412. 633.52–2.483–1.521.6(41.5)
Sixteenth annual report of the Agricultural Research Institute of Northern Ireland, Hillsborough, Co. Down.
1942–43 : Pp. 30.

Susceptibility of flax varieties to fungus diseases has been investigated. A greater variation in resistance to *Polyspora Lini* than to *Colletotrichum Lini* was observed.

SUGAR PLANTS 633.6

413. SORNAY, A. DE and MAZERY, G. 633.61:575.42
Selection of sugarcane seedlings from first-ratoon populations.
Rev. Agric. Maurice 1943 : **22** : 94–101.

The authors discuss the general problem of selection in sugar cane breeding and then consider the special problems involved in ratoon selection. This latter method is believed to have certain advantages over the others.

414. 633.61–2–1.521.6:575(94)
633.61:575.12
Forty-third Annual Report of the Bureau of Sugar Experiment Stations, Queensland 1943 : Pp. 22.

Mungomery, R. W. *Northern Sugar Experiment Station, Meringa.* (*pp. 7–9*).

Reports are given of trials of several varieties and new selections. The varieties Q.44, Comus and Cato gave heavy yields of good quality and have been added to the list of approved varieties.

King, N. J. *Southern Sugar Experiment Station, Bundaberg.* (*pp. 12–15*).

Yield trials and selections are reported for a number of varieties.

Hughes, C. G. *Report of the Committee on Seedling Propagation.* (*pp. 16–17*).

An account is given of the cross-pollination effected during the season 1942–43. The seed will go into cold storage for use in 1944, and previous crosses from the store are being grown and selected at the three experiment stations during the 1943–44 season. Promising selections for the three districts are described and a table is given of the varietal composition of the 1942 cane crop.

Mungomery, R. W. *Report of the Division of Entomology and Pathology.* (*pp. 18–19*).

A trial is reported on the resistance of sugar cane varieties to gumming disease. Of seventeen

varieties tested, six showed varying percentages of infection, while eleven varieties showed no infection. Resistance to Fiji disease was tested for a number of varieties and the following were highly resistant: Q.28, Katha, Saretha, *S. spontaneum* Tank, *S. spontaneum* Burma, and possibly Co. 364. Four Hawaiian varieties were highly susceptible. Tests are also proceeding for a number of other diseases of the sugar cane, viz. downy mildew, leaf scald, chlorotic streak, sclerotial leaf disease, sooty mould fungus, mosaic, top rot and red stripe. Some varietal differences in resistance are noted.

415. Clydesdale, C. S. 633.62:582(94.3)
Saccharine sorghums.
Qd. Agric. J. 1943 : **57** : 197–201.

The most extensively grown types of saccharine sorghum in Queensland are Planter's Friend or Imphee, an old and well tried variety, and the more recently introduced Saccaline and Noney varieties. Good results have been obtained with certain other varieties.

FRUITS 634

416. Sinha, A. C. and
Vyvyan, M. C. 634.11:581.165.711
Studies on the vegetative propagation of fruit tree rootstocks. II. By hardwood cuttings.
J. Pomol. Hort. Sci. 1943 : **20** : 127–35.

Significant varietal differences have been observed in the rooting capacity of hard-wood cuttings of apple rootstocks. In addition, varieties respond differently to identical treatments.

417. Bowman, F. T. 634.11:581.165.711:575.11
Root types among apple clones raised from root cuttings.
J. Aust. Inst. Agric. Sci. 1943 : **9** : 127–29.

The author describes the variation found in the root morphology of apple stock clones propagated by root cuttings. It is believed that the "crown-rooting tendency" is genetically determined.

418. Tydeman, H. M. 634.11:581.165.711:575.11
Further studies on new varieties of apple rootstocks.
J. Pomol. Hort. Sci. 1943 : **20** : 116–26.

Details of the behaviour of 38 rootstock selections derived from crossing members of the Malling series of Paradise stocks are given. Considerable differences in the transmission of vegetative vigour, time of flowering, and other characters were found. The difficulties attending genetical analysis of rootstock characters are noted and it is suggested that vigour is controlled by the cumulative effect of reduplicated factors. A fairly close association between precocity and the genotype of No. IX has been observed.

419. Brown, A. G. 634.13:581.162:581.02
The order and period of blossoming in pear varieties.
J. Pomol. Hort. Sci. 1943 : **20** : 107–10.

An approximately constant order of flowering has been established between 56 varieties of pear grown on Malling Quince A rootstocks. The date when flowering began and also the length of time of flowering varied with climatic conditions. These observations have an important bearing on cross-pollination problems.

420. Bedford, E. C. G. 634.3–2.7–1.521.6
The biology and economic importance of the South African citrus thrips, *Scirtothrips aurantii* Faure.
Publ. Univ. Pretoria 1943 : Ser. II : Nat. Sci. No. 7 : Pp. 68.

This publication includes some details of the resistance of citrus fruit varieties to the South African citrus thrips. Rough lemon is almost immune and Jaffa oranges and "naartjes" are seldom affected.

421. Gorter, G. J. M. A. 634.63–2.484–1.521.6
A leaf-spot disease of the olive.
Fmg S. Afr. 1943 : **18** : 795–98, 801.

This article includes a note on susceptibility and resistance of varieties.

422. Ellis, W. J. and
Lennox, F. G. 634.651:581.6(94)
Some observations on Australian-grown Papain.
J. Coun. Sci. Industr. Res. Aust. 1943 : **16** : 166–72.

Varietal differences in the gelatinase and rennase activities of *Carica Papaya* are reported.

FORESTRY 634.9

423. Cook, W. H. 634.97:575
Division of applied biology.
25th Ann. Rep. Nat. Res. Counc. Canada 1941–42 : 16–18.

Breeding for rapid growth, easy propagation and superior quality has been undertaken with the following trees: spruce, pine, poplar, birch, elm, basswood and maple. The methods used include selection, hybridization and chromosome doubling.

424. 634.97:581.04:576.356.5:575.127.2
Johnson, L. P. V. and 633.63:581.04:576.356.5
Young, G. A. 633.11:575.127.5:633.289:581.04
Genetics and cytology.
Rev. Activ. Nat. Res. Coun. Canad. 1941 : No. 1021 : 22–23.

The progress made in forest tree breeding is described. Spruce, pine, poplar and basswood have been investigated for three years, elm and birch for two years, and maple and ash for one year. Nine different interspecific poplar crosses have been made which have given rise to several hundred new hybrids. Successful crosses have also been effected with birch, elm and pine. Hybridization between *Pinus Peuce* and white pine produced 381 seeds. Chromosome doubling by the colchicine method has been attempted in 27 species. The rapid growth of hybrid poplars does not adversely affect the timber quality.
Tetraploid sugar beet varieties have been obtained by the colchicine technique.
Improved forage grasses have been produced by intergeneric crosses of wheat and *Agropyron*; the hybrid sterility encountered in the initial crosses was removed by colchicine treatment.

425. Johnson, L. P. V. 634.97:581.331.2:581.142
The storage and artificial germination of forest tree pollens.
Canad. J. Res. 1943 : **21** : Sect. C : 332–42.

The best medium for germinating *Pinus* pollen was 10% sucrose in 0·75% agar, while 1·13% bean pod agar was best for *Picea*. Light did not increase the germination percentage but slightly increased pollen tube growth. The best conditions for storage of pollen were found to be low temperature (2° C.), darkness, and medium humidity, 50–75% for *Pinus*, 10–75% for *Picea* and 25–35% for *Quercus*. In all species successfully stored, pollen germination was higher after 12 months storage than after 8 months.

426. 634.972:575(42)
Report of further discussion on post-war forest policy at a general meeting of the Society held in London on 23rd September, 1943.
Roy. Engl. For. Soc., Lond. 1943 : Pp. 43.

Two speakers at this discussion refer to the serious consequences that may follow for forest tree breeding in England on account of the war. Firstly, clear felling may exterminate many of the valuable local forms of oak, ash, beech and other species, and secondly, indiscriminate acorn collection may cause serious deterioration in English oaks since runt trees are often the most prolific bearers.

427. 635.64–2.484:576.16:631.521.6
635.52:575.12

Twenty-eighth annual report of the Experimental and Research Station, Turner's Hill, Cheshunt, Herts. 1942 (1943) : Pp. 78.

Tomato variety trials are reported in which resistance to *Cladosporium fulvum* and *Verticillium* strains has been investigated. Vetomold has shown field immunity to the former fungus but is susceptible to some English strains of this pathogen. Varietal differences in susceptibility to *Verticillium* were observed which depended on the strain of the fungus inoculated.
Two new lettuce varieties, 5*a* and 5*b*, have been obtained from the cross Cheshunt Early Giant x Green Frame. They are earlier than the former variety and are more suitable for steamed soils and rich open soils.

428. White, C. T. 635.654(94.3)

The varieties of Tonga or Tongan bean cultivated in Queensland. Qd. Agric. J. 1943 : **57** : 215–6.

The two main varieties cultivated in Queensland are the Common Tonga (*Dolichos Lablab*) and the Purple Tonga (*D. Lablab* var. *purpureus*).

Part II. Foreign.

STATISTICS 519

429. COCHRAN, W. G. 519.24

Analysis of variance for percentages based on unequal numbers.

J. Amer. Statist. Ass. 1943 : **38** : 287–301.

The ordinary analysis of variance technique may be used when the variates in the array are fractions P_{ij} $(= A_{ij}/N_{ij})$, only with certain modifications. This paper discusses those modifications, and in particular the problem of weighting.

If the actual frequency from the i^{th} cell is f_i, and the population is binomial with parameter p_i, then for sample size n_i the variance of f_i can be expressed in the form

$$p_i q_i/n_i + \sigma_i^2$$

where $p_i q_i/n_i$ is the variance due to the binomial and σ_i^2 the variance due to other extraneous causes. If σ^2 is relatively small, the weight appropriate to f_i is n_i. If σ^2 is relatively large, the weight appropriate to f_i is unity, while if σ^2 is roughly equal to pq/n on average, a method of partial weighting is advised, of which details are given. The justification is empirical, although some mention of efficiency is made. A numerical example of the scheme is given for singly grouped data. In two-way classifications, the sums of squares for the rows and colours are in general non-orthogonal, which implies that such weighting procedures cannot be adopted; in this case, it is necessary to use multiple regression. S. N. C.

430. COCHRAN, W. G. 519.24

The comparison of different scales of measurement for experimental results.

Ann. Math. Statist. 1943 : **14** : 205–16.

In many experiments there may be different methods of measuring the observations, giving different scales of measurement. The author is concerned with the relationships existing between the different scales, and with the testing of hypotheses as to these relationships. Suppose there are two scales of measurement giving estimates of observation x_1 and x_2 whose true population values are ξ_1 and ξ_2: the types of relationship possible are classified as follows (i) $\xi_1 = \xi_2$, (ii) $\xi_1 = \xi_2 +$ constant, (iii) $\alpha\xi_1 + \beta\xi_2 = \gamma$ (where α, β and γ are constants), (iv) $\xi_1 = f(\xi_2, \alpha, \beta_1 \ldots)$ where f is a strictly monotonic function of ξ_2 for given α, β_1, ..., and (v) as in (iv), only f is not strictly monotonic.

The cases of two scales of measurement and of more than two scales are treated separately for the greater part. Most of the attention is paid to types (i) and (ii) in which the general method of approach is the analysis of variance and covariance. S. N. C.

431. COMSTOCK, R. E. 519.24

Overestimation of mean squares by the method of expected numbers.

J. Amer. Statist. Ass. 1943 : **38** : 335–40.

In the analysis of variance of data with two or more criteria of classification and disproportionate numbers in the sub-classes, there are three main methods of attack: (i) fitting constants, (ii) weighting squares of means, and (iii) expected numbers. This paper is a justification of (iii) by reference to a numerical case. The conclusions are that (iii), although not so sound as either (i) or (ii), may be used when the sub-class numbers do not deviate significantly from proportionality as judged by χ^2; and that the over-estimation of a particular interaction in the analysis was not dangerous. For particulars of the method in question, the reader is referred to papers by Snedecor, and Snedecor and Cox. S. N. C.

432. CRIST, J. W. 519.24

The coefficient of contingency for horticultural research.

Proc. Amer. Soc. Hort. Sci. 1943 : **42** : 484–86.

The paper is a presentation of the uses and virtues of the coefficient of contingency $C_1 = \sqrt{\left\{\frac{\phi^2}{1+\phi^2}\right\}}$. If N is the total number of observations in the contingency table which has K rows and columns, a corrected value of λ^2 is given by subtracting $\frac{(K-1)(\lambda-1)}{N}$ from its estimated value. For the probable error of C_1 and for significance levels, the reader is referred to a paper by Pearson in "Biometrika", Vol. X. S. N. C.

433. GUMBEL, E. J. 519.24
On the reliability of the classical χ^2 test.
Ann. Math. Statist. 1943 : **14** : 253–63.

In the test of the goodness of fit of a given sample to a theoretical continuous distribution, the procedure is to divide up the range of the variate into k "cells" and to take $\chi^2 = \sum_{i=1}^{k} \frac{(a_i - \alpha_i)^2}{\alpha_i}$ where a_i is the observed frequency in the ith cell and α_i the expected frequency. If the probability P of this value of χ^2 is too low, the hypothesis is rejected. The paper points out that the arbitrariness of the choice of the number, position and size of the cells can give many different values of P_1 and cites a case where P is at times significant and at times insignificant. It is suggested that k should be chosen first (consistent with the approximations involved) and that the cells should then be taken covering the whole range of the variate such that the expected frequency in all cells is equal. S. N. C.

434. MISES, R. v. 519.24
On the problem of testing hypotheses.
Ann. Math. Statist. 1943 : **14** : 238–52.

This is an entirely theoretical discussion of the theory of the testing of statistical hypotheses, more particularly of the simpler kinds of hypotheses concerning the values of a single parameter. It presupposes the Neyman-Pearson theory, but can be read independently. S. N. C.

435. ROESSLER, E. B. 519.24
Valid estimates of variance in the analysis of pooled data.
Proc. Amer. Soc. Hort. Sci. 1943 : **42** : 481–83.

The paper is concerned almost exclusively with a statement of the fact that estimates of variance are not to be pooled unless they are homogeneous, i.e. unless they may reasonably be supposed to be estimates of the same variance. Particulars of the Bartlett test for homogeneity are given, together with an approximation when the k estimates, v_i ($i = 1, 2, \ldots k$), are based on the same number of degrees of freedom m. Then $\chi^2 = 2{\cdot}3026\ (m - \frac{1}{3})\ (k \log_{10} v - \sum_{i=1}^{k} \log_{10} v_i)$ where $v = \frac{1}{k} \sum_{i=1}^{k} v_i$. This, or an equivalent test, should be done also on the error variances occurring in the analysis of variance, or else the theory is not valid. S. N. C.

436. TORRIE, J. H. and
DICKSON, J. G. 519.24:633.16:581.6
The use of statistical methods in quality evaluation of barley and malt data.
Cereal Chem. 1943 : **20** : 579—94.

The data concern three quantities, namely (i) diastatic power, (ii) yield, and (iii) protein content; we then study the variations in each variable due to different years, different varieties and different stations. The general method of approach has been to use a three-fold analysis of variance in the orthodox manner. Further, estimates are formed at each station of the regression of varietal differences on environmental conditions, and these estimates tested for significance of difference amongst themselves, using the "t" test on any two of the slopes so obtained.

One possibly fresh point contained is the test of significance of difference in the original analyses of variance of x_{ij} from its expected value ξ_{ij}, where x_{ij} is the mean over all years of the variable of the ith variety at the jth station. If the number of varieties is n_1, the number of the stations is n_2 and the number of years is n_3, we have that

$$t = \frac{x_{ij} - \xi_{ij}}{\sqrt{\left\{\frac{k}{n_3} \text{ Error mean square}\right\}}}$$

is distributed as Student's "t" with $(n_1 - 1)\ (n_2 - 1)\ (n_3 - 1)$ degrees of freedom, where the error mean square is the second order interaction and $k = \frac{(n_1 - 1)\ (n_2 - 1)}{n_1\ n_2}$ is a numerical factor to compensate for the non-independence of the numerator and the denominator. S. N. C.

437. COWDEN, D. J. 519.241.1
Correlation concepts and the Doolittle method.
J. Amer. Statist. Ass. 1943 : **38** : 327–34.
This paper gives a notation of use in correlation problems, and includes tables of the algebraic expressions for the various coefficients in multiple and partial regressions for three independent variables.
S. N. C.

438. PLATT, J. R. 519.241.1
A mechanical determination of correlation coefficients and standard deviations.
J. Amer. Statist. Ass. 1943 : **38** : 311–18.
Let equal masses be placed at points $(x_i\, y_i)$, $(i = 1, 2, \ldots N)$, and let X, Y be the moments of inertia about lines through their centre of mass G and parallel to the axes of coordinates, let also I be the moment of inertia of an equal mass at (1, 1) about either line. Then, using the relations:—

$$\sigma_x = \sqrt{\frac{y}{NI}}, \qquad \sigma_y = \sqrt{\frac{x}{NI}},$$

$$r = \frac{\frac{1}{2}(x+y) - D}{\sqrt{xy}} = \left[1 - \tfrac{1}{2}\frac{D}{(x+y)}\right]\left[1 + \tfrac{1}{2}\left(\frac{x-y}{x+y}\right)^2 + \tfrac{3}{8}\left(\frac{x-y}{x+y}\right)^4 + \ldots\right],$$

where D is the moment of inertia about the line through G inclined at the positive angle of 45°; the article describes a mechanical method, involving period of oscillation, of computing σ_x, σ_y and r.
S. N. C.

BREEDING 575

439. KNAPP, E. 575(43)
Deutsche Beiträge zur Vererbungsforschung im letzten Jahrzehnt. (**German contributions to genetical research in the last decade**).
Forsch. Fortschr., Berlin 1943 : **19** : 202–11.
A review is given of genetical work by Germans, including researches on both plants and animals. The review of the literature is grouped under three headings: analysis of the reduction division, mutation and non-mendelian inheritance.
R. M. I.

440. RIEHM. 575:633(43)
Biologische Reichsanstalt für Land- und Forstwirtschaft in Berlin-Dahlem. Wissenschaftlicher Jahresbericht 1940. (**Biological Imperial Institute for Agriculture and Forestry in Berlin-Dahlem. Scientific Annual Report 1940**).
Mitt. Biol. Reichsanst. Landw. 1941 : **65** : 1–110.
[From Gartenbauwiss. 1942 : **17** : (31)–(32)].
The most important occurrence was the incorporation of the State Institute for Plant Protection in Vienna as a branch of the Biological Imperial Institute.
The report includes work on the breeding of potato varieties resistant to degeneration as well as work on the knowledge of varieties and testing varieties for resistance. In the bacteriological section, the resistance of a variety of elm to elm disease is being investigated. Frost and rust resistance are being studied at Gliesmarode.
R. M. I.

441. 575:633(47)
[**For the increase of food and raw material resources of the country. (Programme of research work of Breeding and Genetics Institute of U.S.S.R. for 1942)**].
Proc. Lenin Acad. Agric. Sci. U.S.S.R. 1942 : Nos. 3–4 : 15–22.
The activities of the State Breeding and Genetic Institute referred to include: investigations on the use of freshly lifted potatoes and of cut tops for planting, and testing a collection of 250 varieties; summer sowing of sugar beet; seed multiplication of varieties and hybrids of cereals, herbage plants and cotton evacuated from the Institute at the time of the German invasion; intra-varietal crossing of wheat and supplementary pollination of lucerne and other cross-fertilized plants.

442. 575:633(47)
631.531.12(47)

Osipov, V. S.

(The production of élite seed).

Vestnik Ovoščevodstvo i Kartofel' (Vegetable and Potato Journal) 1941 : No. 2 : 3–11.

In 1939 and 1940 official action was taken, in regard to the R.S.F.S.R., in order to define the term, "élite seed", and to improve the production of the seeds of vegetables and fodder roots. The need for accurately describing different varieties, and defining their genetical character resulted in a conference organized by the Commissariat of Agriculture and held in March, 1941. Among the subjects which were discussed, that relating to genetical purity and deviation from the type aroused much attention. Some of the delegates believed that it was useless or undesirable to enforce standards of conformity to type which might prove too high, and were sometimes sceptical of the value to be gained by allowing certain morphological peculiarities to set a limit to the plant breeders' efforts, or of the reliability of such peculiarities as indicators of a variety. Variation in spine colour in cucumbers, for instance, was ascribed not to hybridization but to the Darwinian principle of "divergence".

The author, who is Chief of the Variety-Seed Department of the Vegetable-Growing Administration of the Agricultural Commissariat, points out in what respects such opinions are erroneous and cites, in support of his statement, some practical results. Many simple morphological characters, unimportant in themselves, are associated in a given variety with other, valuable qualities, and can be used with advantage as indicators of authenticity. The author's experience does not support the view that high yield and quality are incompatible with morphological uniformity.

The opinion is expressed that definite conditions should be laid down indicating the type of admixture that is not permitted, such as hybrids with the wild species in carrot, beet, parsley, radish and various other plants, hybrids with other varieties in cabbage, hybrids with other species in tomatoes, water-melons, etc., and forms with white fruit or white pubescence in cucumbers.

It has been decided that seed production should be carried out only under optimum cultural conditions, with the application of intra-racial crossing and careful selection.

443. 575:633(75.8)

Twenty-third annual report of the Georgia Coastal Plain Experiment Station, Tifton for 1942–43.

Bull. Ga. Cst. Pl. Exp. Sta. 1943 : No. 36 : Pp. 114.

Cotton

Tifton Station 21 is the first variety of wilt resistant cotton to be introduced by this station. Breeding is also in progress to produce improved types of Sea Island cotton.

Maize

An attempt is being made to produce lines that are less affected by external conditions but can be relied upon to give a good yield in most years. Over 500 single and top crosses were tested for yield.

Peanuts

A variety trial is reported. Breeding new varieties is continuing and a large number of hybrids have been tested.

Oats

From trials to produce high-yielding strains of oats resistant to smut and rust, Rustproof No. 14 has been selected and introduced.

Tobacco

Field tests have shown that the Gold Dollar, Yellow Mammoth, Virginia Bright Leaf, Jamaica and Bonanza varieties are all well suited to the production of a desirable type of tobacco under Georgia conditions. Two new varieties selected, M4–6 and Selection 1, show promise of being superior to standard varieties.

Forage grasses

Breeding and selection was continued in 1942 with the following species: Bermuda grass, Dallis grass, Bahia grass, Woollyfinger grass, Sudan grass, Cattail millet, Napier grass, Vasey grass and Harding grass. Several of the new Bermuda grass strains continued to show a decided superiority to common Bermuda.

Water-melons
A new wilt resistant strain was offered to farmers this year under the name Georgia Wilt Resistant. It originated from a cross between Cuban Queen and an early strain of Iowa Belle It is a short "blocky" type, the rind is tough enough for transport and the eating quality fully equal to that of Stone Mountain or Cuban Queen.

Vegetable crops and fruits
The best varieties for Georgian conditions are given for a number of vegetables and for bush and tree fruits.

444. Reed, H. J. 575:633(77.2)
Science solves farm problems and aids agricultural production.
55th Rep. Director Ind. Agric. Exp. Sta. 1942 : Pp. 109.

Wheat
Soft winter wheats are being bred for Hessian fly resistance by hybridizing with Illinois No. 1 W.38. Some of the back-cross progeny show satisfactory combinations of resistance with other desirable qualities. Fairfield is a new soft winter wheat which combines the grain quality of Fulhio with the high yield of Purkof. It is also moderately winter-hardy and is suitable for combine harvesting.

Maize
Significant correlations have been established between maize genotypes and the fat and protein contents of the grain. Vitamin B and the amino-acid values are also probably determined, in part, by genetic factors.

Red clover
Promising strains characterized by drought resistance, vegetative vigour, and resistance to anthracnose are being developed.

Potato
Selection for scab and virus resistance is in progress.

Tomato
It has been found that selection within a strain is ineffectual in bringing about a reduction in core diameter. In order to achieve this, commercial varieties are being hybridized with small-fruited forms. Crosses have been made between standard varieties and two strains which set fruit in hot weather. Some of the progeny of Indiana Baltimore x Allred show promising signs of sun scald resistance; it is hoped that these can be developed into types resistant to *Fusarium* wilt. Heterosis is also under investigation.
Rutgers has been crossed to *Lycopersicon hirsutum* (P.I. 126445) and the progeny back-crossed to the former. The mode of inheritance of the following qualities is being examined: fruit colour and resistance to *Septoria Lycopersici*, *Alternaria Solani* and mosaic.

Soya beans
Patoka is a new yellow-seeded variety characterized by high yield, high oil content and resistance to lodging; it matures at the same time as Kingwa. Gibson resembles Patoka in most respects but matures a few days later.

Sweet corn
Inbreds are being selected for resistance to ear worm.

Popcorn
The yields of hybrids, especially 3-way crosses, exceed those of open-pollinated forms.

445. 575:633(82)
633.11:575(82)
Ramella, R. 633.52:575(82)
La Estación Experimental de Rafaela. Su orígen, desenvolvimiento y aportes al progreso agrícola argentino. (**The Rafaela Experimental Station. Its origin, development and contributions towards Argentine agricultural progress**).
"Granos" Semilla Selecta, B. Aires 1941 : Nos 1, 2 and 3 : 14–19.
The development of the station since its foundation in 1928 is outlined briefly. It has produced two new wheat varieties, the first of which was Rafaela 6 M.A., a hybrid of 38 M.A. x

San Martín released in 1933, the second the now celebrated Sinvalocho M.A. (see "Plant Breeding Abstracts", Vol. XII, Abst. 129). Other promising selections ripening some 6 to 8 days later than Sinvalocho M.A. and derived from the crosses Lin Calel x 38 M.A. and Vencedor x 38 M.A., are now under observation.
A number of selections and hybrids of linseed have been tested but so far none have notably surpassed the variety Klein E. Hybrids between local varieties and forms resistant to *Septoria* are in the F_5 generation.

446. 575:633(92)

Verslag over het jaar 1940 van Het Algemeen Landbouw Syndicaat—Het Zuid- en West-Sumatra Syndicaat—De Centrale Vereeniging tot beheer van Proefstations voor de Overjarige Cultures in Nederlandsch-Indië en van de onder deze Organisaties ressorteerende Vereenigingen en Instellingen. **(Report for the year 1940 of The General Agriculture Syndicate—The South and West Sumatra Syndicate—The Central Association for the Management of Experiment Stations for Perennial Crops in the Netherlands Indies and of the Associations and Institutes under the jurisdiction of these Organizations).**
Batavia 1941 : Pp. 282.

As part of the policy of promoting the cultivation of new economic crops in the Netherlands East Indies, a committee of investigation had been set up under the Department for Economic Affairs (Departement van Economische Zaken) (cf. "Plant Breeding Abstracts", Vol. XII, Abst. 966); and among the crops that promise to be successful are derris and tung. Grants in aid of such work are contemplated.
The invention of a water resistant paper for herbarium and other labels, etc., is recorded.
The scope of the Natuurkundig Tidschrift is to be widened (issued by the Koloniale Natuurkundige Vereeniging) and the three directors of the N.E.I. experimental stations are to co-operate in the production of this journal.
The Advisory Committee on the Promotion of the Cultivation of Industrial Plants issued its 1939 report (cf. "Plant Breeding Abstracts", Vol. XI, Abst. 613).

Rubber

A publication was issued on changes suggested by the Rubber Research Institute of Malaya in the international standardized method of indicating rubber tapping systems. (Cf. "Plant Breeding Abstracts", Vol. XI, Abst. 196).

West Java Experiment Station.
Buitenzorg and South and West Sumatra Division.
Rubber selection made great progress and tapping of about 1000 second generation clones revealed some very promising numbers. Hybridization on a large scale was undertaken. An arrangement was revealed for the exchange of material with the A.V.R.O.S. district, Malaya and Ceylon.
The technique of acetic acid preparation from latex serum or methylated spirit, worked out with the Rubber Research Division, aroused great interest.
Publications included some articles on the international standardization of the nomenclature of rubber tapping systems, on directions for breeding *Hevea* and on rubber preparation.
Water cultures of a few *Hevea* plants were tried.
Mutual influence of stock on scion was studied with various clones and new trials were planned on the Peweja test plantation with buddings of AV 49, PR 107 and War 4, on *H. brasiliensis* and *H. spruceana* stocks.
In 1940, 27,313 artificial pollinations involving 15 families were carried out. The yields from the seedling trial plantation at Pangkalan on Pondok Gedeh estate, concluded in August, 1940, are shown. Branch bud wood was taken from the 5 best producers (including Tjir VIII x Tjir II, Tjir VIII x Plt 4 and BR 2 x PR 106) for grafting in the Tjiomas experimental plantation.
The isolation and preliminary testing of clones from legitimate seedlings proceeded at various experimental centres. The results from the Tjiomas plantation and the Pangkalan (Pondok Gedeh) plantation of buddings (cf. "Plant Breeding Abstracts", Vol. XI, Abst. 777) are referred to. Clone PR 107 at Pangkalan gave a remarkable yield, even more than Tjir I. Comparative figures for wind damage at different altitudes were collected. Storm damage in a

plantation of some (1932) buddings south of Buitenzorg revealed great differences in resistance, BD 5 and Tjir XV being almost uninjured, BD 10 very little damaged and Tjir VIII 90%.
More data on the susceptibility of the most important clones to wind damage were to have been collected.
In a plot trial in 1940, BD 2 and BD 5 appeared to be the most susceptible to stripe canker (with 47% and 38% infection) while Ct 88 and BD 10 were least so (with 21% and 20%).
Tests of the cauterizing effect of two samples of tar on *Hevea* bark of about a dozen old seedlings gave rather big differences between the individual trees, thus showing a small number of trees are inadequate for such determinations.
Other clone trials showed that the BD clones 10, 2 and 5 suffered most from patch canker (18%), and the AV clones least (6–4%).
Among the yields recorded for plantations of selected plant material, the highest were from a large plantation of the clone Tjir I, which in its fourth tapping year gave 1525 kg. dry rubber per ha.
Selection work on estates comprised tests of numerous clones; only one, Lampongiana 2, out of 24 on an estate in the Lampongs district, surpassed the best of the standard test clones.
The seed gardens yielded seed or came into flower in 1940. Observations of several clones were collected on trees in flower or bearing fruit and it was evident that the genotypes of the different lots of seed ready for harvesting at the different times varied greatly. Only a relatively small part of the total number of trees that flowered bore fruit, the best being Tjir XVI and PR 107, of which 30% of the trees produced fruit. The action of environmental factors on fruit setting is being investigated.
By exchange a number of AV clones were acquired from A.V.R.O.S., and three Ceylon clones, with the sole right of sale of these clones in the N.E.I. Measures were taken with A.V.R.O.S. to evolve a more systematic basis of such exchanges.
In the younger plantations of buddings LCB 1320 and AV 255 were outstanding in growth.
Tjir I proved invariably a good producer in plantations of buddings that had come into tap and was equalled by only a few of the recent clones, e.g. WR 101.
In the young seedling trials, many illegitimate seedlings of BR 2 and Waringiana 4 showed good growth, while among those that had come into tap the families Tjir I XXVI and Tjir XVI x I, *inter alia*, were good producers. The illegitimate seedling families varied greatly in yield, sometimes almost equalling good clones and legitimate families and sometimes proving greatly inferior.
Different tapping systems and the whole problem of rubber preparation, including coagulation methods, were investigated.
Experiments on latex from different clones showed little difference in their catalase activity, but some big differences in tyrosinase activity.

Rubber Research Division.
Steps were taken to convert the Rubber Research Division of the West Java Experiment Station into an independent body with its own institute.
Much was done on the physical and colloid chemical properties of latex.

Central and East Java Experiment Station.
Extensive trials of new material, and especially rubber, were conducted in different districts.
Fifty hectares of high-lying ground was put at the disposal of the station for use as an experimental plantation for rubber and it should soon be possible to begin selection in legitimate *Hevea* families under local conditions.
The Station reported favourably on van der Schaaf's new tapping knife for use in the selection of young rubber plants on the basis of latex flow (cf. "Plant Breeding Abstracts", Vol. XI, Abst. 194).
Studies were made of the growth vigour of stocks and the mutual influence between stock and scion.
Various artificial pollinations were made, in particular with GT I. Leaf fall and flowering were recorded for the first time.
The clones AV 161 and PR 7 apparently grow much better than AV 166 and 157, the last named being the worst grower.
In the trials of illegitimate *Hevea* seedlings for resistance to *Fomes lignosus*, a number of foreign *Hevea* varieties are to be included.

Work in plantations for trials included growth recording of various clones and seedling families. In the Solosche district circumference determinations, carried out on legitimate families in one plantation, showed incidentally that the progeny of PB 25 have inherited rapid growth, and the progeny of Tjir XVI slow growth.

Besoeki Experiment Station
In comparative experiments on stocks, a possible instance was recorded of drought resistance in the stock having a good effect on the resistance of the clone used as a scion.
Numerous seedlings were grown from artificial crosses of which 46,000 were made at Kaliwining, 7000 at Kalisanen, and 3650 at Dampar.
The yields for the first three or four tapping years from mother trees selected among hybrid families at Moemboel and Kalisanen were registered and the clones from these trees are to be observed to see if they resemble their mother trees. From the foregoing study it appeared that, by selection of mother trees from their yield in the first year, many of the best producers had been chosen, but also many indifferent yielders, and that some outstanding producers had been missed. The latter were then included also as mother trees. Selection on the basis of the results of several tapping years is more efficient and gives an opportunity for studying secondary characteristics of the mother tree.
Experiments showed that the Gambar method of producing twin plants was superior to the method of the Besoeki Station. Triplets give a low percentage of success and are unsuitable for practical work on a large scale.
Buddings and seedlings of *Hevea spruceana* were planted at Kaliwining.
In the experimental seedling plantation (1937) at Kalisanen, where there are many hybrid and illegitimate families of second generation clones, individual tappings of trees were done every second day for two months and some very good yielders (15–20 grm. dry per tapping) were found; such trees also had a relatively large circumference (up to 45 cm.).
Further work on individual tapping and early tapping is to be done in connexion with thinning problems and also the judging of legitimate and illegitimate plantings.
Reliable clonal differences in the amount of infection with various forms of canker were found in a mixed plantation of BD 5, Tjir I and XVI, the first named showing the greatest damage.
In a spacing experiment at Kaliwining, evidence was obtained that the reaction of spacing on production is a clonal characteristic; the same holds for the tapping system and each clone has its own particular optimum conditions under which it produces most.
Field trials included plantations of many clones and seedlings in various localities. From their performance many seedlings are regarded as worthy of attention.
Experiments on spacing and thinning (including pruning) showed *inter alia* that seedlings should be selected on the basis of production, not on the thickness of the stem.
Mixed plantings (e.g. rubber and coffee) were also studied.

Tea

West Java Experiment Station
Buitenzorg and South and West Sumatra Division
About half of the tea trials, planned to cover 126 hectares, were laid down. The adoption on the estates of the grafting method evolved at the West Java Station made this large scheme for the local testing of the most promising 60 tea clones easier to carry out. Cuttings made with the help of Hortomone A gave very promising results.
Comparative trials on the relation between the development and branching of buddings, on the one hand, and the characteristics of the clone and the stock, on the other, showed that a thick stock gives on the average more shoots per shield than a thin stock. The genotypes showed even clearer differences, buddings with selected clones producing considerably more shoots than buddings with unselected material.
Work on nursery selection and also vegetative multiplication by various methods was continued.
A number of artificial crosses between different clones were made.
Numerous mother trees were selected on different estates and 17 out of the 400 selected trees in plot Ct 1 at Pasir Sarongé were chosen as mother trees and included in row trials.
Experiments on one estate showed that seedlings from high producers give a greater yield of leaf than plants from seed of medium or poor leaf producers, a finding of importance in laying down selected seed plantations.

Seed of *Thea sasanqua* was included in the type collection; about 25% germinated but the resulting plants were not particularly vigorous.
Attempts are being made to improve rate of growth of lamtoro, used as a green manure in tea plantations, by buddings of fast growing clones.
Work on the acceleration of the germination of tea seed was published in Bergcultures (cf. "Plant Breeding Abstracts", Vol. XI, Abst. 183).
Research on shade trees included work on buddings and cuttings of *Calliandra thyrsiflora* and *Leucaena trichodes*. Buddings of *L. trichodes* on *L. glauca* failed.
Local trials of tea clones and a trial of 10 commercial seed types were carried out.
Part one of the manual on the manufacture of Tea (Handleiding voor de Theebereiding) was published.
Methods of determining the colour of brewed tea, the tannin content and the aqueous extract were improved.
Chemical studies on fermentation and the vitamin C and enzyme content of the leaf were conducted.
The effects of shade on quality were also studied.
The micro-method of tea manufacture was used in comparing tea prepared for the first time from GP 3 grown on a highland estate with tea from normal leaf on the same estate. The typical GP 3 flavour was clearly perceptible.

Central and East Java Experiment Station

Seedlings are being planted at Wosobo for type trials and various hybrid clones are being studied.
Various buddings are also in trial including 14 Soeka–Ati clones, 2 Sinumbra–Sperata and 16 Tjinjiroean.

Malang Agricultural Association

There were very favourable market reports on the yield and quality of Malang tea.

Cinchona

Official permission was granted to the Board of Experiment Stations for Perennial Crops in the N.E.I. for the laying down of cinchona plantations for scientific purposes.
Preliminary standard production data have been collected for the cinchona estates.

West Java Experiment Station
Buitenzorg and South and West Sumatra Division

Confidential Communication (No. 16) issued by the West Java Experiment Station dealt with a plan for the intensification of cinchona selection and the establishment of local experimental plantations. Work was also done on the determination of the quinine loss in samples and on sample analyses.
A study was begun of the differences in the quinine content as determined by the method of the Forestry Experiment Station (Boschbouw Proefstation) and the tables from the West Java Experiment Station, and a similar comparative investigation of various tables and methods of determining standard production was also undertaken, but military duties prevented the completion of both investigations.
Analyses of the bark of the clone Tjinjiroean I showed definite periodical changes in content of the various alkaloids present.
Yield data was collected from Ledgeriana clones, manured and unmanured.
The six best clones gave yields of 103, 104, 109, 123, 130, and 139, the standard control, Tjibeureum 5, being taken as 100.
The best clone surpassed the control in bark per dm.^{2}, content and circumference. There was one micro-stylar clone in the trial.
In connexion with seedling selection, large plantings of Tjibeureum 5 and GA 22 were made on estates and at the Experiment Station. Some plants from the same cross were planted out.
Reports from some districts suggest that Tjinj. 1 is very susceptible to *Phytophthora*. The incidence of diseases in other clones was recorded.
The effects of spacing and thinning on yield were examined in the light of experimental data from records covering more than 8 years at Poentjak Gedeh.
Measures were taken to facilitate the periodical estimation of differences in fertility and output of clones and seedlings and the effect of manuring on estates.

Oil Palm

West Java Experiment Station
Buitenzorg and South and West Sumatra Division

In Southern Sumatra mother tree selection was carried out on a large scale and selected seed was regularly supplied by the A.V.R.O.S. General Experiment Station.

Coffee

Central and East Java Experiment Station

In varietal crosses of coffee some of the new importations from Africa were used. Cytological methods were applied in judging the resultant hybrids and are to be regularly used as a check on breeding operations in future.

In the course of experiments on the biology of flowering, reciprocal crosses between some legitimate families were made.

At Soember Asin the effect of pollinations of Kawisari B (a Liberica-Arabica hybrid) with pollen of Arla 1 and Arla 6 (Arabica-Robusta hybrids) was compared with Kawisari B selfed. Similar crosses were made on the Kawisari Estate where Arabica pollen too was available; the object here was ultimately to ascertain the effect of interplanting in the monoclone Kawisari B plantation to increase the set. Various conclusions of physiological interest were recorded.

The results on flowering and set of fruit and on pollen distribution were published.

For cytological work leaf cuttings were made of Arabica, Robusta, Arla and *Coffea eugenioides*; some formed roots, and one leaf, 23 cm. long including the stem, produced a root of 21 cm. Leaf cuttings of Excelsa were not successful.

The 1939 experiment at Kawisari on controlled pollinations of Kawisari B with Conuga, Arabica and self-pollen gave the following results:—

(1) The yield of berries from pollination with Conuga was the highest of all, but contained practically only spongy bean seed; (2) all spongy bean endosperms seemed to have too few chromosomes; (3) the set from Arabica pollen was very low as too little pollen was used.

As Arabica hardly ever flowers simultaneously with Kawisari B, it is inadvisable to use the former as a pollen parent in interplanting. In the present year Hille Ris Lambers carried out some pollinations of Kawisari B by Arla 1, 6 and 16 at Soember Asin with selfings for comparison, while at Kawisari an experiment was arranged conducted on (1) pollinations of emasculated Kawisari B plants with Arabica, Arla 1 and self-pollen; (2) pollination of non-emasculated Kawisari B with Arabica and Arla 1; and (3) Kawisari B under open-pollination. The object was to obtain comparative figures for the pollinations both absolutely and when pollen competition was operating, as is always the case in practice. The Arla forms used were 44-chromosome hybrids believed to flower probably at the same time as Kawisari B. Results cannot be expected till 1941.

Determinations of chromosome numbers made on the types imported from Central Africa showed no deviations from the expected numbers. An effort was again made to identify individual chromosomes, but no differences in length were found to exist between the actual pairs; even if there is a difference between long and short pairs, the transition between the 11 or 22 pairs is too gradual to be of use. Another possible method of identification tried was the total chromosome length of the whole set, and a finding that may be of value was that, in practically all cases examined, the total length of the 44 Arabica chromosomes appeared to be shorter than the corresponding length of the two 22-chromosome types. This method was used for a small lot of spongy bean seed from a trial of Arabica x various Conuga numbers (not emasculated) at Tjandi Sewoe. From 200 seeds, 33 seedlings were obtained of which 4 apparently had 33 chromosomes, and the rest 44. While the former group are obviously hybrids, the latter contained some plants in which the total chromosome length so far exceeded that of Arabica that the possibility of their being hybrids cannot be excluded. Except for a few doubtful cases the rest have been classed as undoubted Arabica selfings. These seedlings were planted at Malang when future observations will decide whether these cytological findings from very young plants form a reliable basis of selection in such cases.

Crosses of Arabica and 22-chromosome types were continued as in previous years. A number of Java hybrids from Djember, owing to drought, provided rather fragmentary results, relating almost solely to F_2; only 1 type in the F_1 could be examined fully.

As in the previous year the correlations between loose chromosomes and open pairs were determined from 100 or more diakineses in the Java hybrids JH 14, JH 21, JH 65, and JH 127. In

all these and in JH 69 (Arabica x Conuga 27–02 in the previous report) the correlation was better than in the Arabica x Robusta hybrids or Kawisari B.
Trivalents and quadrivalents are relatively infrequent except in JH 21 where they constantly appear.
Various experiments were made with colchicine treatment including a large number with controlled Robusta crosses.
Most of the new material from East and Central Africa was planted at Soember Asin and at the Malang Experiment Station. Seed of about 7 Arabica forms was also received from the Scott Agricultural Laboratory, Nairobi.
In the search for mother trees, a number of specially high yielding seedlings with large beans were selected at Soember Asin.
Seed was collected from Excelsa mother trees and Arabica forms.
Some secondary clones at Soember Asin were used as a source of grafting material for preliminary trials.
New crosses made included SA 425 with clones from the family Con 36 x BP 42 (and the reciprocal); Arla forms (Arabica x Robusta) with Kawisari B (and the reciprocal), Robusta-like forms and Arabica; and BP 42 with some imported Uganda numbers from Bangelan.
At Soember Asin some African forms were crossed with Arabica pollen. Seedlings were obtained from *C. Horsfieldiana* x *C. Kapakata*, the first successful cross of *C. Horsfieldiana* with another species.
It is further stated that this year crosses were made between *C. Horsfieldiana* and Arabica, these being so far the only types with somatic 44 chromosomes.
Crosses with SA 13, SA 34, SA 142, SA 158, SA 425 and BP 42 gave many superior families; BP 42 appears to have a good effect on berry size; SA 34, SA 158 and SA 425 on the degree of branching; BP 42, SA 34 and especially SA 425 on the growth vigour; while SA 34 increases the number of berries per cluster.
A study of the vegetative characteristics of diverse coffee clones was undertaken with special reference to clone identification.
Cuttings have been taken from some eelworm resistant mother trees for inclusion in trials of cuttings for resistance to the pest. Con. SA 36 seems to have done well in comparative trials on ground infested with *Tylenchus coffeae*. Field trials with primary clones are also in progress and results are to be published in Bergcultures. Trials of secondary clones and legitimate families are also proceeding. Similar information was collected from Central Java, where the seedling families with SA 34 or BP 42 as one parent appear to be outstanding in yield.

Besoeki Experiment Station
Various aspects of the relation between water supply and flowering in coffee were investigated.
Some drought resistant Arabica seedlings from a new African consignment were received from Malang and planted at Kalisat.
Selection work on Java Hybrids was the subject of a report.
Numerous artificial pollinations were made with Abyssinia, Java Hybrids and Robusta and the "fertility" crosses between the Java Hybrids *inter se* and with Arabica were continued.
Chemical investigation indicated that caffeine content is hereditary and that the Java Hybrids show a wide range from high to low content, according to their parentage.
An interesting correlation exists between oil content (aromatic substances?) and quality. Java has the highest fat content, Robusta the lowest and the Java Hybrids occupy an intermediate position. Tasting experiments confirmed this observation.
In connexion with selection for high lying humid areas, numerous crosses were made with Robusta, Conuga and Uganda clones that had seemed promising.
Selection in seedling plantations for drought tolerance is also in progress, certain BP and Bgn. numbers being regarded as specially valuable material.
Among the Robusta clones exhibiting drought tolerance were BP 46, BP 367, BP 368, BP 369, SA 13, Bgn. 314, Bgn. 325, Bgn. 303, Bgn. 83–03. BP 42 lateral scions are also practically drought resistant.
Vegetative propagation by grafting and estimation of the value of various stocks received considerable attention. Cuttings of different varieties were also compared.
In comparative field trials of clones BP 42 and BP 39 are still regarded as the best clones for the district. BP 46 appears to be drought resistant.
Seedlings and hybrids were also undergoing trials and some promising SA crosses were noted.

Malang Agricultural Association
Weather conditions made it possible to get more positive data on drought resistance of certain clones, as an aid to future selection.

Derris
Central and East Java Experiment Station
Various superior and inferior clones of *Derris elliptica*, among numerous other economic plants, proved to be hosts for *Tylenchus coffeae*.

Cacao
The Inspection and Advisory Committee and Sub-Committee of the Central and East Java Experiment Station was instrumental in raising the question of cacao improvement on the estates and of the establishment of a new experimental plantation for that crop.
Central and East Java Experiment Station
Plans for an experimental plantation in Central Java for cacao and Excelsa coffee selection were concluded.
Numerous mother trees of Djatiroenggo, Getas and Assinan clones were selfed to determine their fertility. The results gave very varying results, but it seems very probable that Djatiroenggo I is self-sterile. The remaining Djatiroenggo clones are self-fertile, but the set from selfing varies greatly between the different clones. The same holds for the Getas clones of which Nos 2, 7 and 15 are probably only slightly self-fertile.
Artificial crosses of Getas clones were made to study flowering and set of fruit and to obtain legitimate families. Artificial pollinations of the Getas clones *inter se* gave a percentage set, ranging in 2 months from 31 to 77%. The chances of effective pollination under natural conditions would appear to be very small judging from the figure 1% (for one month) recorded by the breeder on the staff of the Crone firm.
Preparations were made to plant material for stocks and for buddings. The estates were called on to assist in taking bud wood from selected mother trees in different localities.
Crosses and selfings of the previous year were harvested and seed of DR 1 x 2 and DR 38 was planted.
Yields were obtained from a good trial plantation of legitimate families from Djatiroenggo. Illegitimate Dj. 38, 39 and 37 seem promising.

Leucaena
Besoeki Experiment Station
In connexion with the mealy bug problem in coffee the performance of the hybrids *Leucaena pulverulenta* and *L. glauca* x *glabrata* is being observed (cf. "Plant Breeding Abstracts", Vol. XI, Abst. 478).

Miscellaneous
The cultivation of ramie (*Boehmeria nivea*) and roselle is still occupying attention though the mechanical side of fibre production is presenting difficulty.

Besoeki Experiment Station
Among the miscellaneous crops under observation at the Besoeki Station are trees of *Myroxylon balsamum* (Peru balsam) which have just come into yield, *Copernicia cerifera*, *Derris*, *Aleurites*, bamboo and *Telfairia pedata*. All the specimens that flowered of the last named were male and investigations are in progress to find out whether the absence of female flowers is due to low altitude.

447. 575:633:578.08(44+61)
633.11:575(44+61)
BOEUF, F.
The problem of wheat production in France and in French North Africa.
Int. Rev. Agric. 1942 : **33** : 221T–40T.

This paper concludes a general discussion on the requirements of France and French North Africa in regard to experiment stations, the breeding and testing of new varieties of wheat, and the diffusion of the new varieties among wheat growers.

448. 575.1:007
MARIANI, M. 633.11:575(45)
La scomparsa del grande genetista Italiano Nazareno Strampelli. (**The death of the great Italian geneticist, Nazareno Strampelli**).
Z. Pflanzenz. 1943 : **25** : 61–64.
This is an obituary notice with a brief account of his work in wheat breeding. R. M. I.

449. STERN, C. 575.113.3
Genic action as studied by means of the effects of different doses and combinations of alleles.
Genetics 1943 : **28** : 441–75.
The increase in the number of doses of a mutant allele by means of duplications (in the absence of any other allele of the same locus) is shown to lead cumulatively to more nearly normal phenotypes. In certain cases, however, the presence of a normal allele may lead to a mutant phenotype. An attempt is made to give a theoretical interpretation of the relationship between phenotypic effect and primary interaction of gene and gene substrate.

450. IRWIN, M. R. and
CUMLEY, R. W. 575.17
Immunogenetic studies of species relationships.
Amer. Nat. 1943 : **77** : 211–33.
This paper discusses the relation between immunological reactions, genetics and systematics, mainly from a zoological point of view. It is believed that genes, like antigens, may consist of relatively simple substances which owe their activity, in part, to linkage with proteins.

451. GRANDJEAN, F. 575.2:576.12
La signification évolutive des écarts individuels. (**The evolutionary significance of individual deviations**).
C.R. Acad. Sci. Paris 1942 : **215** : 216–20.
An individual deviation (*écart*) is defined as the absence of an organ normally present or the presence of one normally absent. Using this concept, the author shows that in a breeding unit, the probability p of a deviation appearing may be expressed as a decimal where unity represents the invariable appearance of the deviation. Fluctuating deviations are represented as having lower values of p and it is pointed out that since p may have any value between 0 and 1, so also the distinction between somatic and genetic variation may be relative only. By extrapolating this method, it is possible to speak of group deviation, e.g. in species and genera. It is debated whether variation should be regarded as continuous or discontinuous.
The value of p is believed to depend on the combined action of intrinsic and extrinsic factors. Evolution would come about consequently by the accumulative augmentation or diminution of p in any particular direction.

452. LYSENKO, T. D. 575.3
The nature of heredity.
Proc. Lenin Acad. Agric. Sci. U.S.S.R. 1942 : Nos. 11–12 : 3–5.
The author maintains that more knowledge can be gained as to a plant's hereditary nature by studying its reactions than by hybridization. The argument is illustrated by reference to phasic development in cereals.

453. HAZEL, L. N. 575.42:575.22:519.24
The genetic basis for constructing selection indexes.
Genetics 1943 : **28** : 476–90.
The author gives a multiple correlation method of constructing selection indexes with maximum accuracy.

ORIGIN OF SPECIES 576.1

454. HERRERA, A. L. 576.11
A new theory of the origin and nature of life.
Science 1942 : **96** : No. 2479 : p. 14.
The author has investigated the behaviour of thin films of a solution of ammonium thiocyanate in formalin and reports the formation of structures having activities analogous to living

processes. Starch, two amino-acids, a substance resembling protein and various pigments are believed to have been produced.
In view of these experiments, it is suggested that life may have arisen, and may still arise, by the interaction of the products of volcanic activity.

455. AMADON, D. 576.12
Specialization and evolution.
Amer. Nat. 1943 : **77** : 133–41.

It is suggested, in contradiction to a generally held view, that morphological specialization need not lead to evolutionary implasticity. Highly adapted parasites are excluded from this proposition but it is believed that, in many cases, specialization may lead to a greater degree of adaptability than that found in generalized types.
This hypothesis is held to afford some explanation of the "missing links" in the phylogenetic sequence, for it is thought likely that new classes of organisms arise from rare and highly specialized ancestral forms.
Evolution as a whole is regarded as a process with a natural trend towards increase in morphological complexity, and specialization, therefore, becomes no more than the acceleration of this tendency. It is admitted that small populations of specialized forms may become non-adaptive but this might possibly result in the production of new forms pre-adapted to new environments.
A final section discusses the relation of these ideas to taxonomy.

456. CORNMAN, I. 576.12:575.113.5
A basis for ostensible reversal of evolution.
Amer. Nat. 1943 : **77** : 90–93.

Arguing from genetical and embryological data, the author elaborates the theory that the apparent exceptions to the law of evolutionary irreversibility are explicable by the unmasking of a persistent developmental potentiality. The masking factors are believed to be analogous to suppressor genes.

457. WRIGHT, S. 576.12:575.24:575.41:519.24
Statistical genetics and evolution.
Bull. Amer. Math. Soc. 1942 : **48** : 223–46.

The author develops the mathematical theory of evolution as "a process of statistical transformation of populations." It is concluded that the mean selective values ($\overline{W}$) of possible random breeding populations form a surface relative to the multi-dimensional system of gene frequencies, the gradient of which determines the way in which the population tends to change under the influence of selection. The distribution of gene frequencies is treated both for reversible and irreversible mutations and the concluding sections include an analysis of the effects of population size and geographical isolation on evolution.

458. SCHMIDT, K. P. 576.12:581.9:575.41
Corollary and commentary for "climate and evolution."
Amer. Midl. Nat. 1943 : **30** : 241–53.

This article deals with the zoological evidences bearing on W. D. Matthew's theory of geographical distribution but its conclusions are of general biological interest. It is believed that primitive forms are seldom found in the evolutionary centre of an affinity but that, instead, the centre of origin is occupied by the recently evolved forms, the older types being pushed out peripherally by natural selection. The northern hemisphere is regarded as being, in general, the principal site of evolutionary activity so that the southern continental land masses represent peripheral regions into which the older species are driven. This explanation is held to explain the tranverse similarities of fauna and flora observed between the land masses in the southern hemisphere and it has the advantage of not requiring the existence of hypothetical land bridges.
Exceptions to the general southward movement of species are found in a few minor northward tendencies and also in the "hanging relics" which show extreme specialization to various ecological environments.
The greater vigour of the weeds of the northern hemisphere when compared to those of the southern regions is cited as evidence for the main thesis.
A concluding section stresses the importance of "palaeopeninsulae" in investigations of geographical distribution.

459. BALL, G. H. 576.12:632
Parasitism and evolution.
Amer. Nat. 1943 : **77** : 345–64.
Evidence is presented to show that a high degree of pathogenicity in a parasite may not indicate a recent and imperfect stage in the development of host-pathogen relations.

460. CHARLES, D. R. and GOODWIN, R. H. 576.16:575.113:633.913
An estimate of the minimum number of genes differentiating two species of golden-rod with respect to their morphological characters.
Amer. Nat. 1943 : **77** : 53–69.
The number of genes differentiating *Solidago sempervirens* from *S. rugosa* has been calculated. The formulae used were two introduced by Wright, the first giving the minimum number of gene substitutions needed to explain a difference in a measurable character between isogenic lines, and the second, the number of genes having manifold effects, viz:—

(1) $$n = \frac{(V_P - V_p)^2}{8\,(\sigma_2^2 - \sigma_1^2)}$$

(2) $$n_L\,(1-2c) + n_e = \frac{\Delta x \Delta y\,(r_2 R_x\,R_y - r_1)}{8\,(R_x^2 - 1)\,(R_y^2 - 1)}$$

A minimum number of 21 genes is needed to cover the differences between the species in leaf structure and about twice this number to account for the divergences observed in the morphology of the complete plants.

461. ANDERSON, E. and HULRICHT, L. 576.16:581.14
The histological basis of a specific difference in leaf texture.
Amer. Nat. 1943 : **77** : 285–87.
The differences in leaf texture between two species of *Uvularia* are believed to depend on differences in cellular morphology. This finding is held to illustrate the notion that "species differences are harmoniously expressed through the whole architecture of the plant, through the operation of basic esthetic laws".

CYTOLOGY 576.3

462. GEITLER, L. 576.31
Morphologie und Entwicklungsgeschichte der Zelle. (**Morphology and history of development of the cell**).
Fortschr. Bot. 1941 : **10** : 1–17.
[From Gartenbauwiss. 1942 : **17** : p. (14)].
This report deals with the new developments in general cytology including work on the experimental basis of the mechanics of mitosis and meiosis, the finer structure of the chromosomes and the resting nucleus and "the inner polyploidization" in plant tissues.

R. M. I.

463. PAINTER, T. S. 576.31:581.192
Cell growth and nucleic acids in the pollen of *Rhoeo discolor*.
Bot. Gaz. 1943 : **105** : 58–68.
The distribution of ribose nucleic acid in the anthers, pollen grains and pistil of *R. discolor* has been investigated by estimating the basophilic reaction of the cells before and after treatment with ribose nuclease. In the young anthers, the cytoplasm of both the tapetum and the archesporium are rich in ribose nucleic acid. This disappears in the pollen mother-cells just before meiosis I and it is suggested that it passes into the nucleus where it is converted to desoxyribose nucleic acid. The young pollen grains are first devoid of ribose nucleic acid but as they mature, large amounts begin to accumulate in the cytoplasm. Since the tapetal cells disorganize to a fluid matrix during sporogenesis, it is thought probable that they provide the source of nucleotide material to the maturing pollen grains. Ribose nucleic acid is abundantly distributed along the track down which the pollen tube grows and it may act as a further source of material to the germinating pollen grain.

464. Claude, A. and
Potter, J. S. 576.312.32:581.192
Isolation of chromatin threads from the resting nucleus of leukemic cells.
J. Exp. Med. 1943 : **77** : 345–54.
Chromatin strands have been isolated from mouse leukemia by gently grinding the tissue in a mortar with sand and subsequent differential fractionation in a centrifuge. The threads obtained, although from resting nuclei, exhibit a close morphological resemblance to chromosomes and give the Feulgen reaction for desoxyribose nucleic acid.

465. 576.353:537.531:581.331.23
Swanson, C. P. 535.61–31:576.353:581.331.23
Differential sensitivity of prophase pollen tube chromosomes to X-rays and ultraviolet radiation.
J. Gen. Physiol. 1943 : **26** : 485–94.
The sensitivity of the generative nucleus of the pollen tubes of *Tradescantia* towards ultraviolet irradiation and X-rays has been investigated. After the 2-hour stage of prophase, the sensitivity to ultra-violet light decreases but it is thought possible that the apparent reduced sensitivity of the 0 and 1 hour stages may be due to the shielding effect of the pollen wall. X-ray effects rise to a maximum at the 4-hour stage and then decrease to zero at the 10-hour stage. A correlation has been established between the frequency of X-ray breaks and uptake of water at germination and spiralization movements. Sensitivity to ultra-violet light may depend either on the nucleic acid cycle, or the condition of the matrix, or the state of subdivision of the chromosomes; up to the present, however, there is insufficient evidence bearing on this point.

466. Steinitz, L. M. 576.353:581.04:633.16
The effect of lack of oxygen on mitosis in barley.
Amer. J. Bot. 1943 : **30** : 622–26.
The following mitotic aberrations were observed when barley was grown in an oxygen-free atmosphere: (*a*) the distinction between heterochromatin and euchromatin became more pronounced, (*b*) the nucleoli of resting nuclei were more prominent, (*c*) the nuclear membrane tended to disorganize, (*d*) chromosomal contraction was greater than usual, (*e*) chromosome fragments were produced, and (*f*) anaphase bridges, probably analogous to the effects produced by the "sticky" gene of maize, were formed. It is thought probable that oxygen deficiency may affect mitosis through its influence on respiratory processes; other mechanisms are also considered.

467. Piza, S. de Toledo 576.354.4
The uselessness of the spindle fibers for moving the chromosomes.
Amer. Nat. 1943 : **77** : 442–62.
The meiotic sequence of the scorpion, *Tityus bahiensis*, is described and since the coiled chromosomes are attached to the spindle long before metaphase and do not appear to affect it in any way during the untwisting movements of prophase, it is concluded "that the spindle fibers are nothing else than the optical expression of a physiological activity of the chromosomes, that is, of their power of responding with co-ordinated movements to the action of the forces operating during mitosis". Only the fibres derived from the centromeres appear to be constant in position and it is thought probable that the remainder are merely secondary products of the coagulation which occurs during staining.
A new hypothesis of the mechanism of meiosis is put forward on the basis of these and other facts. The chromosomes are believed to have a permanent power of mutual repulsion and the centromeres to be the centres of kinetic activity. During prophase, a secondary attraction, superimposed on the repulsion, is set up between homologous chromosomes. At first, this is diffuse and results in pairing along the length of the chromosome; later it becomes concentrated in the centromere. The latter becomes localized on one side of the chromosome which is consequently dorsiventral, a fact for which cytological evidence in adduced. This dorsiventrality is expressed physiologically by a localization of the attractive forces to the ventral side, the dorsal exhibiting the residual repulsion.
At metaphase, the force of attraction, which is believed to exist also between the poles and the

chromosomes, becomes inoperative in the nuclear field, since the ventral sides of the chromosomes along which the attractive forces have become localized, are now adpressed to each other. Only the residual repulsive force on the dorsal side is active externally and as a result the chromosomes are repelled to the equator of the spindle. It has already been explained that the spindle plays a secondary role in meiotic movements.
During anaphase, the attraction between the ventral sides of the chromosomes diminishes until it is less than the attractive force between the poles and ventral surfaces. At this stage, the ventral surfaces separate and the chromosomes rotate so that the dorsal sides face one another. The forces of repulsion between these combined with the polar attraction cause the chromosomes to move once again to the poles. In this phase, the forces of repulsion become concentrated in the centromere which appears therefore to drag the arms of the chromosomes in its wake.

468. Sax, K. and
Brumfield, R. T. 576.354.4:537.531
The relation between X-ray dosage and the frequency of chromosomal aberrations.
Amer. J. Bot. 1943 : **30** : 564–70.

Experiments with *Tradescantia* and *Vicia* have shown that, although the frequency of one-hit X-ray induced chromosomal aberrations increases generally in a linear relation to dosage and the frequency of two-hit aberrations according to the square, yet considerable variation both in absolute frequency of two-hit effects and in the value of the dosage curve exponents occurs. Possible causes of these results are discussed.

469. Swanson, C. P. 576.354.46:581.03
Some considerations on the phenomenon of chiasma terminalization.
Amer. Nat. 1942 : **76** : 593–610.

Hypotheses of chiasma movement based on the theoretical existence of electrostatic forces are criticized. It is pointed out that such suggestions are plausible on account of their adaptability to the interpretation of particular phenomena but that they are not susceptible to direct experimental investigation. Moreover, the repulsion between centromeres only occurs when the latter are on the metaphase plate, laggard bivalents showing none of the attenuation effects characteristic of metaphase configurations.
The author develops the theory that terminalization is determined principally by the mechanical forces set in operation by despiralization. Several cases of correlation between the degree of terminalization and the extent of chromosome contraction are known and this relation may be varied in a particular plant by means of heat-shock treatment. It is suggested also that terminalization may not begin in some species until the mechanical forces engendered by despiralization reach a threshold value. Distal movement of chiasmata is believed to be a consequence of the fact that the distance from the centromere to the first proximal chiasma is generally greater than the distance between succeeding chiasmata.

470. Giles, N. H. (jun.) 576.356
The origin of iso-chromosomes at meiosis.
Genetics 1943 : **28** : 512–24.

An anomalous type of centromere behaviour resulting in the production of two distinct and complementary types of isochromosomes is shown to take place in a single plant of *Gasteria*. Although mitosis is quite normal, irregularities appear at the first meiotic metaphase, the chromosome affected being fairly long, with a submedian centromere. Precocious splitting of the centromere, either in a transverse or longitudinal direction, with subsequent union in twos of either sister or non-sister halves is considered to be the explanation of the facts observed. Of the three types of microspores only the normal ones and those possessing an isochromosome with the two long arms of the original chromosome finally develop.

471. Emsweller, S. L. and
Brierley, P. 576.356:581.036.1
Effects of high temperature on metaphase pairing in *Lilium Longiflorum*.
Bot. Gaz. 1943 : **105** : 49–57.

The effect of high temperature treatment on two varieties of *L. longiflorum* has been

investigated. The frequency of "blown-up" cells (those in which extensive chromosome fragmentation has occurred), asynapses, and restitution nuclei was increased by the treatment. Enucleate pollen mother-cells and cells containing only a few nuclei were also found and these types were able to persist up to the time of meiosis I.

472. Thomas, J.-A. 576.356:581.04
Action du *p*-aminophénylsulfamide sur la chromatine de l'oeuf d'Oursin en segmentation. (**The action of *p*-aminophenylsulphamide on the chromatin of the sea urchin egg in segmentation**).
C. R. Acad. Sci. Paris 1942 : **214** : 90–93.

Chromosomal aberrations and abnormal mitoses have been observed in cells treated with *p*-aminophenylsulphamide. It is believed that a disturbance of the nucleic acid metabolism is involved.

473. Swanson, C. P. 576.356.2
Secondary association of fragment chromosomes in generative nucleus of *Tradescantia* and its bearing on their origin.
Bot. Gaz. 1943 : **105** : 108–12.

The meiotic behaviour of chromosome fragments in *Tradescantia* has been investigated. Secondary association of these fragments with either the ends or centric regions of normal chromosomes was observed. It is probable that the end-pairing, at least, is specific. The possible origin of one arm of one of the fragments is discussed; intercalary deletion, overlapping inversion and translocation are suggested as possible methods by which the fragment arm may have arisen.

474. Rudorf, W. 576.356.5:576.12:575
Die Bedeutung der Polyploidie für die Evolution und die Pflanzenzüchtung. (**The significance of polyploidy for evolution and plant breeding**).
Angew. Bot. 1943 : **25** : 92–114.

A review of researches on polyploidy is given which shows the diversity that exists among polyploids in their habitats, growth, fertility and economic value. The ever-increasing data on the subject reveal its complexity, not at first suspected.
There is a bibliography of 80 titles. R. M. I.

475. Carey, M. A. and McDonough, E. S. 576.356.5:581.04:635.25
On the production of polyploidy in *Allium* with paradichlorbenzene.
J. Hered. 1943 : **34** : 238–40.

Polyploidy has been induced in the roots of *Allium* sp. by means of *p*-dichlorobenzene.

476. Modilevskiĭ, Ja. S. 576.356.52
(**Haploidy in angiospermous plants**).
Uspehi Sovremmenoĭ Biologii (Advances in Modern Biology) 1942 : **15** : 129–53.

Tables are presented showing that haploids are now known in some 44 genera, representing the widest variety of different families. The haploids are in general smaller, though there are exceptions; the majority of them are sterile; and some haploids differ from the respective diploids in certain morphological features.
The various ways in which haploids may arise are outlined, namely interspecific hybridization, X-ray irradiation, temperature change, polyembryony, etc.
Detailed observations were made on behaviour of the chromosomes in three *Nicotiana rustica* haploids in the formation of the embryo sac mother cells. The results are compared with the findings of others working with haploids in other species and genera.
Detailed examination of the chromosomes in the haploids has shown them to be composed of a thread with more deeply staining granules disposed along its length. The thread is at first continuous and gradually breaks up into the individual chromosomes. Delay in completely breaking up sometimes gives the appearance of terminal pairing and this is thought to provide an explanation of many conflicting reports regarding conjugation in haploids found in the literature.

SEXUALITY 577.8

477. Allen, C. E. 577.8:576.12:575.11
The evolution and determination of sexual characters in the angiosperm sporophyte.
Torreya 1943 : **43** : 6–15.

The author reviews the problem of sex determination in the angiosperms. It is suggested that the frequent presence of rudimentary stamens and carpels in unisexual flowers and the even more frequent lability of sex expression may indicate that hermaphroditism is the primitive condition. Cases of mutations determining male or female sterility are discussed and it is pointed out that the evolution from hermaphroditism to unisexuality would probably take place in several stages.

In the case of maize, more than 40 genes are known which affect normal sex expression, and such examples indicate that sex determination is a function of many genes in addition to which the cytoplasm may also play a part.

BOTANY 58

478. Lang, A. and Wettstein, F. v. 581.1
Entwicklungsphysiologie. (**The physiology of development**).
Fortschr. Bot. 1941 : **10** : 278–307.
[From Gartenbauwiss. 1942 : **17** : p. (4)].

The major part of this report is devoted to the problem of determination in its widest sense. By means of experiments the questions of heterosis and of the interaction of genome and plasma have been carried further. Much of the work has for its subject the germination and dormancy of the seed of flowering plants. Important researches have been made on the material basis of the development of organs. The problems of the action of auxins, vernalization, photoperiodicity and flower-producing substances are discussed.

The final section deals with age and regeneration as well as the developmental physiology of propagation. R. M. I.

479. Camp, W. H. 582
The herbarium in modern systematics.
Amer. Nat. 1943 : **77** : 322–44.

The present relation of taxonomy to other branches of biology is discussed.

480. Merrill, E. D. 582
Some economic aspects of taxonomy.
Torreya 1943 : **43** : 50–64.

The author shows that a sound taxonomic system is essential for other branches of pure and applied botany.

481. Svenson, H. K. 582:581.9:576.12
Modern taxonomy and its relation to geography.
Torreya 1943 : **43** : 44–49.

The relation between taxonomy on the one hand, and plant geography and evolutionary theory, on the other, is reviewed. After discussing the questions of relic species and the recognition of an original holarctic Cretaceous flora, the author proceeds to contrast neo-Darwinian theories of species formation with the view put forward by Willis.

AGRICULTURE 63

482. Lysenko, T. D. 63.00.15(47)
(About some of the main aims of agricultural science).
Proc. Lenin Acad. Agric. Sci. U.S.S.R. 1942 : Nos. 5–6 : 3–12.

In this lecture the main results of the recent efforts to apply agricultural science directly to the war needs are outlined. Excellent results have been obtained by cutting wheat in Siberia and Kazahstan in the first ten days of September, before the grain is fully ripe, so as to avoid the autumn frosts.

It has been found that wheat seeds with a high moisture content are much less susceptible to frost damage when they have not completed their dormancy period than when they are fully mature. When cereal seeds are placed in a cold or frosty store-chamber immediately after harvest, their dormancy period is often very prolonged, even up to six months. It can be broken by treatment at 5–10–20° C. for 7–10 or occasionally up to 20 days.

The shortage of potato planting material has been very considerably relieved by the successful use of the cut tops from canteens. If the potatoes from which the tops are cut are still in a dormant state the tops can be kept quite well through the winter when stored at a suitable temperature and in layers of a suitable thickness. Successful methods have also been found for getting a crop from freshly lifted potato tubers.

The best time for sowing sugar beet in Uzbekistan has been shown to be June–July, not the spring as was formerly supposed.

The spring wheat variety Milturum 0321 which gives the best yields in Siberia in good years is late in ripening and sometimes fails to mature; attempts are being made to find an equally good earlier variety. By growing winter wheat varieties under extremely severe conditions it has been possible to produce forms hardier than Lutescens 0329, which is the hardiest variety previously known. It is thought that these experiments are more successful if in the early stages the wheats are planted not in an open field but in a stubble or in admixture with some other small seeded crop that is killed off by the frost but affords a certain amount of protection to the wheat.

PLANT DISEASES AND PESTS 632

483. *Izrailsky, V. P. 631.521.6:633:575.3
(Acquired immunity in plants).
Uspehi Sovremmenoĭ Biologii (Advances in Modern Biology) 1942 : **15** : 162–89.

The author discusses at length the results of his own experiments and those of other investigators on acquired immunity in plants and the existence of antibodies.

484. Ullrich, H. and Seemann, J. 632.111–1.521.6:578.08:633
Über die Verwendung von handelsüblichen Kühlschränken für Frostresistenzversuche an Pflanzen, insbesondere Frostresistenzprüfungen. **(On the use of the usual commercial refrigerators for researches on frost resistance in plants, especially tests of frost resistance).**
Z. Pflanzenz. 1943 : **25** : 1–7.

Details are given of the means by which the main disadvantage of using an ordinary refrigerator for experiments in frost resistance, the differences in temperature between the walls and innermost space, can be satisfactorily overcome by inserting a second cupboard, insulated by double walls enclosing a layer of air, into the refrigerator. R. M. I.

485. Elliott, C. 632.3:582:001.4
Recent developments in the classification of bacterial plant pathogens
Bot. Rev. 1943 : 9 : 655–66.

The author reviews recent changes in the classification and nomenclature of bacterial plant pathogens.

486. Luria, S. E. and Delbrück, M. 632.3:632.8–1.521.6:575.242:575.11
Mutations of bacteria from virus sensitivity to virus resistance.
Genetics 1943 : **28** : 491–511.

Working with the bacterial virus α and its host *Escherichia coli* B, the authors present experimental evidence to support the view that resistance to the virus is due to a heritable change in the bacterial cell occurring independently of the action of the virus. The mutation rate of the bacterium has also been determined.

487. Greis, H. 632.4:577.8:581.162.5
Mutations- und Isolationsversuche zur Beeinflussung des Geschlechtes von *Sordaria fimicola* (Rob.). [**Experiments in the isolation of mutations with reference to the influence of sex in *Sordaria fimicola* (Rob.)**].
Z. Bot. 1941 : **37** : 1–116.
[From Gartenbauwiss. 1942 : **17** : (11)–(12)].

After a preliminary account of the range of sex forms found in the fungi, the transition from functional sexual reproduction with fully differentiated gametangia, through pseudogamy to

* An abridged translation of this paper is on file at the Bureau.

autogamy with functionless antheridia is discussed, with reference to the species: *Sordaria macrospora*, *S. fimicola*, *S. uvicola*, *S. Brefeldii* and *Sporodinia grandis*.
A detailed description of the sex relations of *S. fimicola* follows. Labile sexuality in which sex determination is determined by the biological relation of the interacting mycelia is frequent. By means of X-rays, 73 mutant sex types out of 52860 spores treated were obtained. These included pure female, pure male and mixed types, and the first two groups are sub-divided on the basis of the intensity of sex expression. Sterility factors were detected which prevented the copulation of gametangia and these interacted in some cases with the bipolar segregation scheme and produced an apparent tetrapolar behaviour. No association between sex and sterility factors was observed.
Difficulties were experienced in the attempt to synthesize bisexual forms from the union of female and male lines owing to the presence of sterility factors. Asci were produced from mating the unisexual strains with normal types. A 2 : 2 segregation of types with and without realizers was obtained from the germination of one tetrad; the deficient lines exhibited considerable sexual lability but the others were stable.
Concluding sections review the question of sex relations in the Basidiomycetes and Ascomycetes.

488. Bonner, D.,
Tatum, E. L. and
Beadle, G. W. 632.421.9:575.243:581.192:575.116.7
The genetic control of biochemical reactions in *Neurospora:* a mutant strain requiring isoleucine and valine.
Arch. Biochem. 1943 : **3** : 71–91.

A mutant of *N. crassa* obtained by X-ray treatment of a single ascospore, is described. It requires valine and isoleucine for normal growth although it can become "adapted" to their absence. Crosses between the mutant and normal forms indicate that this character is determined by a single gene, about 12 units removed from the centromere; it is not sex linked.

489. Leonian, L. H. and
Greene, L. V. 632.422.3:576.16:575.243
Induced autotrophism in yeast.
J. Bact. 1943 : **45** : 329–39.

Eight strains of *Saccharomyces cerevisiae* have been induced to grow on media deficient in one or more of the vitamins usually necessary. The technique used involved the use of large quantities of inocula, a prolonged incubation period and a successive sub-culturing on vitamin-deficient media. In this way, many strains differing *inter se* were obtained which were autotrophic in respect of 1–5 of the vitamins normally necessary. These lines could be maintained in vitamin deficient cultures but in most cases reversion to heterotrophy took place after transference to normal yeast media. The authors discuss the significance of these results for the questions of taxonomic delimitation in micro-organisms and the nature of biological variation. It is possible that the dauermodification concept may prove useful in these respects.

490. Marcilla Arrazola, J. and
Feduchy Mariño, E. 632.422.3:581.6
Contribución al estudio de una levadura perteneciente al género *Saccharomycodes*, capaz de fermentar mostos de uva fuertemente sulfitados (Mostos azufrados), sin previa desulfitación. (**Contribution to the study of a yeast belonging to the genus *Saccharomycodes*, capable of fermenting sulphurous grape must without previous removal of SO_2).**
Bol. Inst. Invest. Agron. Madr. 1943 : No. 9 : 1–40.

Descriptions are given of the growth of the yeast strain in question on various media; it was found that doses up to 2 grm. of SO_2 per litre in grape juice did not suppress the capacity of the organism for fermentation. The strain, referred to provisionally as V.40, does not correspond to either *S. Ludwigii* or *S. Behrensianus* and may ultimately be given the status of a new species, *S. Mestris*. The rate of fermentation is slow but the wine produced is of good flavour.

491. Chilton, St. John P. 632.451.2:575.242:575.11
A heritable abnormality in the germination of chlamydospores of *Ustilago zeae.*
Phytopathology 1943 : **33** : 749–65.

A variant of *U. Zeae* is described in which the germinating promycelia undergo disintegration or produce only a few spores in an irregular manner; no abnormalities were observed in other stages of the life cycle. The character is heritable, probably segregating according to a multifactorial scheme. There was a tendency for the spores produced by hybrids of this variant to form solopathogenic lines.

No explanation has yet been found for the fact that these solopathogenic lines tend to revert to the normally germinating type, or for the correlation observed between exceptionally large chlamydospores and abnormal germination.

492. Stakman, E. C.,
Kernkamp, M. F.,
Martin, W. J. and
King, T. H. 632.451.2:575.242:575.114
The inheritance of a white mutant character in *Ustilago zeae.*
Phytopathology 1943 : **33** : 943–49.

The genetical behaviour of a white mutant of *Ustilago Zeae* has been investigated and segregation of this character in the progeny of a cross with the normal type has been established. It is concluded that the white form is a true mutation. Although dikaryotic mycelia could be produced by mating compatible white lines, no functional chlamydospores were ever formed.

493. Fischer, G. W. and
Holton, C. S. 632.451.3:576.16:576.12:582:001.4(73)
Studies of the susceptibility of forage grasses to cereal smut fungi. IV. Cross-inoculation experiments with *Urocystis tritici*, *U. occulta*, and *U. agropyri*.
Phytopathology 1943 : **33** : 910–21.

Cross-inoculation experiments with *U. Tritici*, *U. occulta* and *U. Agropyri* are reported. Twelve grass species were susceptible to *U. Tritici* and one wheat variety to *U. Agropyri*; four grasses were susceptible to *U. occulta*. Physiological races can be differentiated within *U. Agropyri* and *U. Tritici*.

It is considered probable that *U. Tritici*, which is morphologically indistinguishable from *U. Agropyri*, has arisen in the U.S.A. from a strain of the latter species capable of attacking wheat. If this conclusion is admitted, the binomial *U. Tritici* should be rejected and the flag smut of wheat recognized as a race of *U. Agropyri*. It would also follow from this suggestion that the Australian flag smut is phylogenetically distinct from the American form.

494. Stakman, E. C.,
Loegering, W. Q.,
Cassell, R. C. and
Hines, L. 632.452:576.16:633.11:581.02(73)
Population trends of physiologic races of *Puccinia graminis tritici* in the United States for the period 1930 to 1941.
Phytopathology 1943 : **33** : 884–98.

This paper describes the population trends of *P. graminis Tritici* races in the U.S.A. throughout the years 1930–1941. Changes in the relative abundance of the physiological races may be very sudden and have serious consequences on the wheat crops.

The causes for these fluctuations have not been examined thoroughly but it is probable that climatic conditions and the distribution of wheat varieties are among the most important factors.

495. Olive, L. S. 632.452:576.354.4:576.312.315
Nuclear phenomena involved at meiosis in *Coleosporium Helianthi.*
J. Elisha Mitchell Sci. Soc. 1942 : **58** : 43–51.

The course of meiosis in *C. Helianthi* is described. A spireme appears to be formed in prophase and during the succeeding metaphase, centrosomes with conspicuous polar radiations become

differentiated. The nucleolus, which has a double appearance in prophase, is believed to divide into two, each half persisting through anaphase and telophase to form the nucleolus of the daughter cells. A chromosome number of 8 is most probable.

496. Yust, H. R.,
Nelson, H. D. and
Busbey, R. L. 632.7:576.16:634.3
Comparative susceptibility of two strains of California red scale to HCN, with special reference to the inheritance of resistance.
J. Econ. Ent. 1943 : **36** : 744–49.

Two strains of the California red scale (*Aonidiella aurantii* Mask.) which attacks citrus fruits were shown to differ in susceptibility to fumigation with hydrocyanic acid. Results of hybridizations between the two strains indicate that the gene for resistance is a sex-linked character and that resistance is incompletely dominant.

497. DuBuy, H. G. and
Woods, M. W. 632.8:576.12
Evidence for the evolution of phytopathogenic viruses from mitochondria and their derivatives. II. Chemical evidence.
Phytopathology 1943 : **33** : 766–77.

Chemical evidence is presented in support of the theory that plant viruses have arisen from mitochondria, the latter being regarded as structures equivalent to plastids but lacking the pigmentation complex. Ribose nucleic acid was demonstrated in the protein fraction of extracted plastids and it is suggested that the latter have given rise to viruses by the loss of the pigment and lipoid components.

498. Rischkov, V. L. 632.8:577.15
The nature of ultra-viruses and their biological activity.
Phytopathology 1943 : **33** : 950–55.

The author discusses the biological nature of viruses and reports, *inter alia*, that tobacco mosaic virus has a phosphatase activity.

499. Lennette, E. H. 632.8:581.192
Recent advances in viruses. A brief survey of recent work on viruses and virus diseases.
Science 1943 : **98** : 415–23.

The author reviews recent advances in virus research. Differences between viruses and bacteria are discussed and it is believed that no absolute distinction between them can be drawn. Plant viruses appear always to contain ribonucleic acid but those found in animals may contain this substance or desoxyribose nucleic acid.

500. Sievers, A. F.,
Lowman, M. S. and
Russell, G. A. 632.951.1:581.6:576.16
Factors affecting the rotenone content of devil's shoestring.
J. Econ. Ent. 1943 : **36** : 593–98.

It has been found that the roots of *Tephrosia virginiana* only produce rotenone in a few restricted localities. Plants from these places have been transplanted to other districts in order to ascertain whether their high rotenone content is determined by environmental or genetic factors. Transplants and seedlings maintained their rotenone values but crown divisions, although possessing a high rotenone content in two localities, showed a marked diminution in a third. The cause of this last effect is not understood but it is concluded that, in general, rotenone content is genetically controlled.

ECONOMIC PLANTS 633

501. Lelesz, E. 633:577.16
The problem of increase in vitamin content of agricultural products in view of improving the diet of the people.
Int. Rev. Agric. 1942 : **33** : 265T–85T.

This article includes a list of the vitamin C contents of a number of economic plants and also discusses factors which influence the vitamin content.

502. HUSFELD, B. 633–2–1.521.6:575
Zur Züchtung krankheitswiderstandsfähiger Kulturpflanzen. (**The breeding of cultivated plants resistant to disease**).
Angew. Bot. 1943 : **25** : 115–25.
One of the main factors that cause fluctuation in the yield of cultivated crops is disease. In some cases chemical treatment suffices but where this is impossible or too laborious and costly other measures must be used. Breeding resistant plants may solve the problem provided new forms and races do not arise. The ideal is to breed plants immune to all biotypes of the pathogen by taking into account physiological, chemical, anatomical, morphological or mechanical resistance. R. M. I.

503. 633–2.112–1.521.6(56)
DIX, W. 633–1.524(56)
Acker- und Pflanzenbaufragen in der Türkei. (**Problems of agriculture and plant cultivation in Turkey**).
Landw. Jb. 1943 : **93** : 1–47.
The importance of growing drought resistant plants with a short life cycle in Anatolia is indicated, and among the suitable pasture and other plants enumerated are the wild forms of beet, *Beta lomatogona* and *B. trigyna*, in the cultivation of which experiments were made, the results being compared with those of Scheibe and other workers.
The uses of wild beet in Turkey and the causes of drought in Anatolia are discussed.

504. 633–2.7–1.521.6:575
BREDEMANN, G. 633.15–2.7–1.521.6:575
Über die Züchtung heuschreckenresistenter Pflanzen. (**On breeding plants resistant to locusts**).
Z. PflKrankh. 1941 : **51** : 337–42.
[From Gartenbauwiss. 1942 : **17** : p. (19)].
In some countries, the only means for the control of locusts is to grow resistant plants, such as the "Maiz amargo," which on account of its pubescence is only reluctantly attacked by the insect. The author has found a high yielding strain of Evergreen Sweet Maize which is also pubescent and is avoided by the locusts and which possibly might be grown in place of the less high yielding "Maiz amargo". The qualities which prevent attack vary in different species and each must be investigated but the author considers the prospect of resistant plants promising. R. M. I.

CEREALS 633.1

505. THOMAS, B. 633.1:664.641.016:578.08
Glasigkeit und innere Kornausbildung. (**Vitreousness and internal conformation of the grain**).
D. Mühlenlab., Leipzig 1941 : **11** : 57–64.
[From Forschungsdienst 1943 : **15** : (p. 72)].
The determination of vitreousness by transillumination takes about a quarter of the time needed for an analysis by cutting. The apparatus needed is very simple to construct. With rye no useful correlations were found between the degree of vitreousness and other internal quality features, but in wheat various correlations of this kind are observed which permit of deductions from the vitreousness as to the internal nature of the grain or predictions as to the best treatment of the particular lot of wheat tested.

WHEAT 633.11

506. *KAMÇIOGLU, H. I. 633.11:575(56)
Türkiye ve Ecnebî buğdaylarinin teknolojik evsafi ve bilhassa ekmeklik kabiliyetlerinin tetkik ve mukayeseleri. (**The study and comparison of the technical properties and especially the baking qualities of foreign and Turkish wheats**).
T.C. Ziraat Vekâleti Yüksek Ziraat Enstit. Çalişmal. 1941 : No. 107 : Pp. 163.
An intensive study has been made of the Turkish bread wheats, especially those which are most suitable for baking. One of the main objectives is the production of export wheat of high and uniform quality. Improving the yield is another important consideration.

* An extended abstract of this paper is on file at the Bureau.

A similar study of the *Triticum durum* forms has shown that in the southern districts these are mainly spaghetti types, whilst in central Anatolia many of the forms are found to be quite suitable for bread making. Lodging is an important consideration in *T. durum* and one of the tasks of the seed improvement stations must be to provide strains resistant to lodging. Chemical studies have shown the Turkish wheats to be lower in maltose and ash contents.

507. Heyne, E. G., Wiebe, G. A. and Painter, R. H. 633.11:575.113.7:576.16
Complementary genes in wheat.
J. Hered. 1943 : **34** : 243–45.

Two complementary genes have been examined which determine a lethal necrosis when present in the double dominant condition *Le Lc Le2 Le2*. Gene *Le* is carried by Marquillo and Big Club while *Le2* is present in Fultz, Honor, Shepherd, Dawson, Fulcaster, Harvest Queen, Fulhard, Clarkan, Chiefkan, Red Chief and Blackhull. Fulcaster and Fulhard are heterozygous for the factor *Le2*. It is suggested that these genes may be of use in the determination of phylogenetic relationships between wheat varieties.

508. Smith, D. C. 633.11:575.127.5:633.289:581.162.5
Intergeneric hybridization of *Triticum* and other grasses, principally *Agropyron*.
J. Hered. 1943 : **34** : 219–24.

Successful crosses have been made between *T. durum* and *T. aestivum*, on the one hand, and *A. trichophorum* and *A. intermedium*, on the other. The results obtained using different varieties of these species are described and the causes of the defective development which frequently characterizes the hybrid zygotes are discussed. In some cases, the seed set from the crosses reached a value of 95%.

509. Kononenko, M. V. 633.11:575.3:581.143.26.03
(**The effect of the dates of seeding on the nature of winter wheat in successive generations**).
Proc. Lenin Acad. Agric. Sci. U.S.S.R. 1942 : Nos. 1–2 : 41–44.

The experiment consisted of dividing seed of the three winter wheat varieties Hostianum 0237, Ukrainka and Krymka 05 into several lots. One lot was sown in August for 3 successive years, another lot in September, another in October and another in November. It was found that the progeny from the October sowings were 20–25% more frost resistant, although none of the plants in the preceding years had failed to survive. The progeny of the October sowings of Hostianum 0237 had greater cold requirements for effecting vernalization than the other sowings, even those made in November, where the plants passed a large part of their vernalization stage during the spring months; this was not so for Krymka 05, which has a shorter vernalization stage, and in this variety the progeny of the November sowings had the highest cold requirement.
The highest yields were obtained from the progeny of the sowings made at the end of September or the beginning of October.

510. Perak, J. T. 633.11:576.356.5:581.04
Triticum durum tetraploide obtenido por colchicina. (**Tetraploid *T. durum* obtained by colchicine**).
An. Inst. Fitotec. Santa Catalina 1940 : **2** : 7–8.

By injecting a 1% solution of colchicine into the coleoptile, plants with enlarged stomata were obtained in *T. durum*, *T. pyramidale* and *T. Timopheevi*. Only that from *T. durum* reached maturity; it was highly sterile and produced only four seeds. From these, two plants were obtained, both having 56 chromosomes in the root tips.
No polyploids were obtained by treating the seed or the spike.

511. Whiteside, A. G. O. and Jackson, S. H. 633.11:577.16
The thiamin content of Canadian hard red spring wheat varieties.
Cereal Chem. 1943 : **20** : 542–51.

Significant varietal differences between wheat varieties in respect of vitamin B_1 content are

reported. Climatic conditions also affect this character and a negative correlation between it and test weight per bushel, and 1000 kernel weight has been established. A positive correlation exists between thiamine content and protein.

512. WILLIAMSON, J. 633.11:581.162.32(82)
Las hibridaciones naturales en el trigo. (**Natural crosses in wheat**).
"Granos" Semilla Selecta, B. Aires 1941 : Nos. 1, 2 and 3 : 20–22.

Natural hybrids have been found nearly every year for the last 10 years in the wheat variety tests at the Experimental Station at Pico (La Pampa). Thus in the variety 38 M.A., awnless plants and plants with short awns have been found, and others differing in ear colour. Recently the variety Sinvalocho M.A. has produced a number of natural hybrids, including a number of sterile hybrids with rye. Hybrids with rye have also been found in 38 M.A.

513. WALDRON, L. R. 633.11–1.557
Comparison of large and small kerneled wheat as to yield, grown alone and intermixed in the row.
Bi-m. Bull. N. Dak. Agric. Exp. Sta. 1943 : **5** : No. 6 : 27–32.

Experiments are reported demonstrating that large kernel size is an important component of wheat yields.

514. VALLEGA, J. and
CENOZ, H. 633.11–2.421.1:576.16:631.521.6(82)
Reacción de algunos trigos a las razas fisiológicas de *Erysiphe graminis Tritici* comunes en Argentina. (**Reaction of certain wheat varieties to the physiological races of *E. graminis Tritici* common in Argentina**).
An. Inst. Fitotec. Santa Catalina 1941 (1943) : **3** : 45–58.

Three physiological races, distinguished by their effect on the wheat varieties Lin Calel, Chul, Sonora and Normandie, have been detected among samples of the parasite from different parts of Argentina. They differ in their pathogenic properties from the races reported from the U.S.A. and Germany, and are capable of attacking both Vernal and Dixon.
Most Argentine varieties tested were susceptible, semi-resistance being found in Klein 157 and certain other derivatives of the cross Hope x Lin Calel. Among the imported wheats, Normandie, Axminster and a Russian wheat USSR No. 22.233 were immune. Certain other varieties, though not resistant to all 3 races, were resistant to the commonest race Arg. 1. One interesting selection from the cross Riccio x Lin Calel, made by J. Arzuaga, is described as being resistant to *E. graminis Tritici* and also to *Oidium*, *Puccinia glumarum* and *P. triticina*. *Triticum Timopheevi* was immune and certain immune forms were also found in *T. monococcum* and *T. dicoccum*, all other species tested being susceptible.

515. ATKINS, I. M. and
QUINBY, J. R. 633.11–2.451.3–1.521.6:576.16
"Comanche", disease-resistant wheat, for planters of the plains.
Sth. Seedsman 1943 : **6** : No. 11 : 17, 44.

Comanche, a recently introduced bunt-resistant wheat (cf. "Plant Breeding Abstracts", Vol. XIII, Abst. 1200), is described.

516. VALLEGA, J. 633.11–2.452:576.16(81)
Especialización fisiológica de *Puccinia graminis Tritici*, en Brasil. (**Physiological specialization of *P. graminis Tritici* in Brazil**).
An. Inst. Fitotec. Santa Catalina 1940 : **3** : 29–36.

Samples of the parasite were obtained by air from various points in Brazil. Three races, 15, 17 and 42 were discovered; these are the same races as occur in Argentina and Uruguay, race 15 being the most widespread; race 11 is also present in the 2 latter countries. It would appear therefore that it is sufficient to breed wheats resistant to these 4 races, since new races seem to originate very rarely in the countries concerned.

517. 633.11–2.452–1.521.6:576.16(76.4)
633.13–2.452–1.521.6:576.16(76.4)
WOOLFORD, B. C. 633.16–2.452–1.521.6:576.16(76.4)
Deep south gets new, anti-rust recruits.
Sth. Seedsman 1943 : **6** : No. 10 : 9, 53, 57.

Three new rust resistant cereals suitable for the southern U.S.A. are described. Austin wheat, derived from Hope x Mediterranean, is resistant to stem rust, leaf rust and loose smut; it does not shatter and has satisfactory milling and baking quality. Tunis barley is derived from a north African introduction; it is a six-row bearded spring type which is high yielding and resistant to leaf rust. The Verde oat was obtained from a double cross and combines resistance to crown and stem rusts with a high degree of leafiness.

518. ISHIKAWA, K.,
NOZU, H. and
NISHIMURA, H. 633.11–2.8–1.521.6:575(52)
(Examination of mosaic-resistance in wheat breeding experiments.)
Plant Breed. News 1935 : 2389–96.

Observations on disease resistant wheats are recorded from the Kyushu districts in Japan, and the Saga Prefectural Experimental station has also conducted experiments on resistance of wheat to yellow and green mosaic. A total of 152 strains from various combinations was investigated with the susceptible variety Ejima Shinriki and the resistant Shinchucho as controls.

Early planting was associated with a higher incidence of mosaic. The resistance to green and yellow mosaic, which are two different diseases, was found to differ. Of the 152 wheats only 10, including Kyukei A No. 490 (Konosu No. 25 x Shinchuco), Kyukei A No. 884 (Shinchucho x Ejima Shinriki), Saga-majiri 23–1–2–5 (Konosu No. 25 x Shiro-komugi No. 72), Saga-majiri 36–1–19–12–4 (Ejima Shinriki x Wakayama), Saikai No. 45 (Ejima Shinriki x Pusa No. 12), Saikai No. 7 (Shiroboro No. 21 x Akabozu) and Shinchuchow, were resistant to both diseases. All efforts should be made to increase this number by breeding more resistant varieties.

519. JOHNSON, J. A.,
SWANSON, C. O. and
BAYFIELD, E. G. 633.11:664.641.016:578.08
The correlation of mixograms with baking results.
Cereal Chem. 1943 : **20** : 625–44.

The correlation between mixogram data and the various components of baking quality has been investigated statistically.

520. KIHARA, H. and
MATSUMOTO, K. 633.11*Aegilops*:575.127.2:576.354.46:581.162.5
Nachkommen mit einem Genomtyp von *Aegilops variabilis* in der F_4 Generation des Bastardes *Ae. ovata* x *variabilis*. **(Progeny with an *Aegilops variabilis* type of genome in the F_4 generation of the hybrid *Ae. ovata* x *Ae. variabilis*.)**
Jap. J. Genet. 1940 : **16** : 291–94.

A study from 1936 to 1940 of the progeny of an *Ae. ovata* x *Ae. variabilis* cross showed that, from the F_3 to the F_5, the chromosome complement was 14_{II} and that in the F_4 some strains exactly resembled *Ae. variabilis* in genome structure.

Morphologically, the F_1 was intermediate between the parents, but in the F_4 and F_5 all strains were like *Ae. variabilis*.

When back-crosses of the F_4 hybrid (No. 242–20) to each of the parent species and the reciprocal cross, *Ae. ovata* x No. 242–20, were made, the hybrid No. 242–20 x *Ae. variabilis* alone showed 14_{II} chromosomes, and 83·33% fertility on selfing. Chromosome association in the remaining two crosses showed much irregularity, accompanied by complete infertility on selfing.

The writer concludes that the genome of No. 242–20 is homologous with C^uC^uHH, the genome of *Ae. variabilis*, and he indicates how this genome could have been acquired in the F_4 derived from the cross between *Ae. ovata* which is C^uC^u EE and *Ae. variabilis*. In the observations on the above cross, two male sterile plants were found in the F_4 and 32 in the F_5, and the possible existence of a gene for this condition is being investigated.

OATS 633.13

521. VALLEGA, J. 633.13–2.452:576.16(82)
Especialización fisiológica de *Puccinia coronata avenae*, en Argentina. (**Physiological specialization of *P. coronata Avenae* in Argentina**).
An. Inst. Fitotec. Santa Catalina 1940 : **2** : 53–82.

Many oat varieties classed as resistant to *P. graminis* and *P. coronata* in other countries have proved susceptible in Argentina. Investigations of the physiological forms of the latter species occurring in Argentina have revealed the presence of only four, Nos 1, 45, 55 and 56; all four are however extremely virulent forms, and the last two are new. Race 55 attacks both Bond and Victoria, the only variety which is immune to it being Glabrota (*A. strigosa*). Race 56 attacks all varieties except Bond and Glabrota. There are indications that both race 1 and race 45 could be further subdivided if the range of differential hosts were extended. Race 1, which is the least virulent, is much the most common.

Data are given on the reaction of a number of oat varieties and hybrids to the four races. Those found to be most promising for use as parents are Selection 37.24/629 of the Instituto Experimental y de Investigaciones Agrícolas at Santa Fe, and Mútica Ukrania C.I.3259, both resistant to races 1, 55 and 56. It is suggested that these varieties should be crossed with Victoria or its hybrids, such as Mar, resistant to race 45. A study of the ancient local land races is also recommended, as many of them are also probably possessed of valuable resistance genes.

No reduction in resistance with the approach of maturity was observed in the resistant varieties. The fact that varieties such as Victoria are attacked only late in the season is evidently due to the later incidence of races 55 and 56 to which they are susceptible. All the observations made so far indicate that *P. coronata* has no functional intermediate host in Argentina.

MAIZE 633.15

522. 633.15:575(81)
Conferência sôbre a genética do milho. (**Lecture on maize genetics**).
Rev. Agron., São Paulo 1943 : **7** : 499–501.

The lecturer, Dr. J. A. de Souza Soares, gave a brief account of the agricultural research in progress in Brazil and of the methods of breeding maize.

523. DIAS, B. P. 633.15:575(81)
O melhoramento do milho. (**Maize breeding**).
Rev. Agron., São Paulo 1943 : **7** : 424–27.

The methods of maize breeding are outlined for the benefit of Portuguese readers and the cultivators are encouraged to carry out selection themselves.

524. CASTRO, C. 633.15:575(86)
Informe rendido al Vicepresidente Wallace sobre el mejoramiento del maiz. (**Report presented to Vice-president Wallace regarding maize breeding**).
Rev. Fac. Nac. Agron., Colombia 1943 : **5** : No. 20 : 15–21.

The three distinct climatic zones of Colombia where maize is grown are described. A collection of varieties from the different zones and elsewhere has been made and subjected to careful observation. Varieties and hybrids imported from North America have not been a success. The best strains in the collection are now being inbred in preparation for the production of hybrid seed.

525 MARINO, A. E. 633.15:575"793"
Relación entre el número de hojas y la precocidad cuando varían las épocas de siembra en el maíz. (**Relation between the number of leaves and earliness when the time of sowing is varied in maize**).
Rev. Argent. Agron. 1943 : **10** : 239–43.

"Seven varieties and hybrids of corn were planted every fifteen days and it was found that the number of leaves becomes larger with later plantings, while the period from germination to tasseling becomes shorter.

"The relation between the two variables was studied by the covariance method. Regression coefficient 'between varieties' was positive, though non-significant, in agreement with the law of Kuleshov.

"Regression coefficients within varieties and individual regression coefficients of varieties were negative and significant." Author's Summary.

526. Mazoti, L. B. 633.15:575.11:581.48
Estudio genético sobre maices amilaceos de Argentina. (**Genetical study on starchy Argentine maize**).
An. Inst. Fitotec. Santa Catalina 1940 : **2** : 17–26.
A starchy gene found in maize stocks from Corrientes and Misiones in Argentina is described; crosses with testers indicated that it is allelomorphic with fl_1 in chromosome 2, from which it differs by being recessive in two doses; whereas fl_1 in two doses is dominant.
Another starchy gene was found in maize from La Pampa and was located in chromosome 7; it is thought to be probably identical with o_2.

527. Horovitz, S. 633.15:575.116.1.061.6
Nuevo gen del cuarto cromosoma de maíz (*lyteomaculata*). [**A new gene of the fourth chromosome in maize** (***luteomaculata***)].
An. Inst. Fitotec. Santa Catalina 1941 (1943) : **3** : 13–19.
A recessive gene *lu* is described which causes yellow patches on the leaves. Data are given showing that it is linked with the genes of the fourth chromosome and probably situated between Ga_1 and De_1.

528. Sprague, G. F. 633.15:575.12
Building new corn hybrids.
Fm Sci. Rep., Iowa 1941 : **2** : No. 4 : 7–9.
An elementary account of maize hybrid breeding is presented.

529. Morgan, D. T. (jun.) 633.15:576.312.3
The formation of chromocenters in interkinetic nuclei of maize by knobs and *B* chromosomes.
J. Hered. 1943 : **34** : 195–98.
The structure of resting nuclei in maize plants has been examined and compared to the meiotic configurations. A correlation has been established between the number of chromocentres in the resting nuclei and the number of chromosome knobs and B chromosomes at pachytene. Since the number of chromocentres is sometimes less than would be expected, it is assumed that chromocentre fusion is not infrequent. Occasionally, the number of chromocentres exceeds expectation and two alternative suggestions are offered, firstly, that diffuse heterochromatin has been misclassified as chromocentric material, or secondly, that small knobs have been overlooked at pachytene.

530. Einset, J. 633.15:576.356.4:576.356.2:575
Chromosome length in relation to transmission frequency of maize trisomes.
Genetics 1943 : **28** : 349–64.
The breeding behaviour of eight of the primary trisomics of maize has been investigated and it was found that the extra chromosome was transmitted to less than 50% of the progenies. After discussing various theories proposed to cover this occurrence, the author maintains that the ratio of trisomic to disomic offspring produced, when a trisomic maize plant is pollinated by a normal diploid, is the same as the gametic ratio. The loss of the extra chromosome occurs during meiosis, probably through desynapsis of a trivalent form in prophase. This effect is more frequent in the case of shorter chromosomes and may be due to a lower frequency of chiasma formation. The univalent formed in this way behaves erratically and often disintegrates in the cytoplasm.
The cause of the considerable variation in transmission frequency within a single trisomic stock is not clear. Environmental and genetic influences may be important. The population of 1916 plants derived from the $(2n + 1) \times 2n$ cross included 658 trisomics, 2 haploids, 6 monosomics, 4 triploids, a 19-chromosome plant with an extra fragment, a 20-chromosome plant also with an extra fragment, and five 21-chromosome plants with extra fragments. All the plants with chromosome fragments developed either feebly or not at all.

531. Shank, D. B. 633.15:581.143:575.11
Top-root ratios of inbred and hybrid maize.
J. Amer. Soc. Agron. 1943 : **35** : 976–87.
Significant differences have been established between inbred maize lines in respect of the ratio:

dry weight of shoot / dry weight of roots. Several genes appear to determine this quantity and since the hybrids exhibit practically the same quotient as the lower ratio parent, it is concluded that the low ratio alleles are dominant.

532. Boceta Durán, V. 633.15:581.162.32:578.08
Nuevo dispositivo para realizar fecundaciones artificiales en el maíz. **(New device for effecting artificial maize pollinations).**
Bol. Inst. Invest. Agron. Madr. 1943 : No. 9 : 277–87.
The method described consists in detaching the male inflorescence and enclosing it in the bag surrounding the female inflorescence, the cut stalk being immersed in a small metal water container attached to the stalk. In this way a set of almost 100% has been obtained.

533. Borgeson, C. 633.15:581.162.32:578.08:631.557
Methods of detasseling and yield of hybrid seed corn.
J. Amer. Soc. Agron. 1943 : **35** : 919–22.
A slight reduction in the seed yield of hybrid maize results from the removing of one leaf during detasselling. Larger reductions result from the removal of two or three leaves, a significantly greater effect being reported for early maturing lines than for later strains.

534. Horovitz, S.,
Marchioni, A. H. and 633.15:581.6:575.11
Fisher, H. G. 635.67:581.6:575.11
El factor su_x y el aumento del contenido de azúcar, en el maíz para choclo. **(The factor su_x and the increase in sugar content in sweet corn).**
An. Inst. Fitotec. Santa Catalina 1941 (1943) : **3** : 37–44.
A new sugary gene found in local Argentine maize is described; it is linked with *Y* for yellow endosperm, with about 30% of crossing-over, and with *Pl*, in the sixth chromosome. There are indications that it is distinct from su_2 and it is provisionally designated su_x. In the presence of $su_x\ su_x$ heterozygotes for $Su_1\ su_1$ become wrinkled like $su_1\ su_1$. Plants of the type $su_1\ su_1\ su_1\ su_x\ su_x\ su_x$ and $Su_1\ su_1\ su_1\ su_x\ su_x\ su_x$ could not be distinguished. A mixed sample of them when analysed contained 13·80% of sugar as compared with 5·14 in the ordinary sugary and 3·22 in the $Su_1\ Su_1\ Su_1\ su_x\ su_x\ su_x$ plants. The effect of the two genes in combination is thus more pronounced than that of either acting alone.

535. Sprague, G. F.,
Brimhall, B. and
Hixon, R. M. 633.15:581.6:575.115
Some effects of the waxy gene in corn on properties of the endosperm starch.
J. Amer. Soc. Agron. 1943 : **35** : 817–22.
Gene *wx* (waxy endosperm) is not completely recessive and it has been found possible by chemical tests to differentiate between the endosperms of *Wx wx wx*, *Wx Wx wx* and *Wx Wx Wx*. The effect of the *Wx* allele appears to be additive.

536. Lonnquist, J. H. and
Jugenheimer, R. W. 633.15–2.112–1.521.6:581.162.3:575
Factors affecting the success of pollination in corn.
J. Amer. Soc. Agron. 1943 : **35** : 923–33.
The effects of high temperature and desiccation on the grain yield of maize have been investigated. Significant negative correlations were obtained between high temperature and yield of inbred lines and a positive correlation between yield and resistance to leaf firing.

537. Horovitz, S. and
Marchioni, A. H. 633.15–2.7–1.521.6:575.11
Herencia de la resistencia a la langosta en el maíz "Amargo". **(Inheritance of locust resistance in "Amargo" maize).**
An. Inst. Fitotec. Santa Catalina 1940 : **2** : 27–52.
This paper has already been reviewed from another source (see "Plant Breeding Abstracts", Vol. XII, Abst. 378).

538. IMMER, F. R. and HENDERSON, M. T. 633.16:575.116.1
Linkage studies in barley.
Genetics 1943 : **28** : 419–40.

Data are presented on the linkage relations of a number of factor pairs in barley, together with tables for use in calculating the percentage recombination and standard error in the F_2 and F_3 progenies. The linear order of a number of genes has been determined in the following chromosomes:—

I .. *tr–v–e–y–f–lg–or*, IV .. *i–k–zd–lgl–gl–gl2–bl*, and VII .. *yc–fc–br–t*.

Chlorina seedling (*f*3) and light green seedling (*lg*3) are each inherited independently of one or more factors in each of the seven barley linkage groups.

539. PERAK, J. T. 633.16:576.312.35(82)
Número de cromosomas de algunas espécies de *Hordeum* espontáneas en Argentina. (**Chromosome number in certain wild *Hordeum* species in Argentina**).
An. Inst. Fitotec. Santa Catalina 1941 (1943) : **3** : 7–11.

There are 5–6 indigenous species of *Hordeum* in Argentina and several adventive species. The haploid number 7 was found in *H. pusillum* Nutt. var. *typicum* and var. *euclaston* (Steud.) Hauman, *H. compressum* Gris., *H. stenostachys* Godrn. and *H. murinum* L.; $n = 14$ was found in *H. leporiñum* Link. and *H. jubatum* L. var. *pampeanum* Hauman.

540. ROBERTSON, D. W., LUTE, A. M. and KROEGER, H. 633.16:581.142
Germination of 20-year-old wheat, oats, barley, corn, rye, sorghum, and soybeans.
J. Amer. Soc. Agron. 1943 : **35** : 786–95.

Hull-less barleys, two-rowed hulled types, and six-rowed hulled types differ *inter se* in the viability of their grain during long period storage.

541. 633.16:581.46:575(76.4)
Smooth bearded barley available for farmers.
Sth. Seedsman 1943 : **6** : No. 10 : p. 57.

Texan is a recently introduced variety of barley which is characterized by smooth awns, resistance to mildew and high yields under Texas conditions; it is susceptible to rust.

MILLETS AND SORGHUM 633.17

542. WERTH, E. 633.171:576.16
Zur Herkunft der Kultur der tropischen Hirsen in Afrika. Zugleich eine Entgegnung auf die Ausführungen von W. Lindenbein. (Zur Geschichte und Geographie der Kulturplanzen und Haustiere XXI). [**On the origin of the cultivation of the tropical millets in Africa. At the same time a reply to the assertions of W. Lindenbein. (On the history and geography of the cultivated plants and animals XXI)**].
Bot. Jb. 1943 : **73** : 106–12.

The author holds that the cultivation of the tropical millets had its origin in Southern Asia (India) whence it passed to Africa (south of the Sahara). In reply to W. Lindenbein's criticisms (cf. "Plant Breeding Abstracts", Vol. XII, Abst. 795) the author defends the validity of his theory of ethnological cultural trends ("Kulturstromlehre") as an important aid in the study of the historical origins of plants and animals in various countries.

543. 633.174:575.42
"Bonita", grain sorghum hybrid, makes bow.
Sth. Seedsman 1943 : **6** : No. 11 : p. 20.

The variety Bonita is described, also Early Hegari, an early maturing selection of hegari.

RICE 633.18

544. Kik, M. C. and
Landingham, F. B. van 633.18:577.16
Riboflavin in products of commercial rice milling and thiamin and riboflavin in rice varieties.
Cereal Chem. 1943 : **20** : 563–69.

Rice varieties have been analysed for thiamine and riboflavin contents. Significant varietal differences were discovered and it is probable that environmental effects are also important.

545. Williams, V. R.,
Knox, W. C. and
Fieger, E. A. 633.18:577.16
A study of some of the vitamin B-complex factors in rice and its milled products.
Cereal Chem. 1943 : **20** : 560–63.

A number of rice varieties have been analysed quantitatively for the following vitamin B components: thiamine, pantothenic acid, nicotinic acid and pyridoxine.

546. Beachell, H. M. 633.18:581.143.26.035.1:581.9
Effect of photoperiod on rice varieties grown in the field.
J. Agric. Res. 1943 : **66** : 325–40.

Varietal differences in the response of rice varieties to short-day treatments are reported. It was found that, in general, the response of the various types was correlated with the latitude in which they were native, the more sensitive strains being derived from extra-tropical forms.

547. Martin, A. L. 633.18–2.484–1.521.6:575
***Rice investigations.**
Rice J., Texas 1940 : **55** : 161–67.

Three selections of Kameji x Blue Rose have been made which yield better than Blue Rose, and combine earliness with resistance to *Cercospora* leaf spot. A hybrid selection combining resistance to *Helminthosporium Oryzae* and *Cercospora Oryzae* has been crossed with Blue Rose and the F_1 back-crossed to the latter variety. Types resembling Blue Rose but having a similar disease resistance to the hybrid selection have been obtained in the resultant progeny.

FORAGE GRASSES 633.2

548. Severson, H. 633.2:575(73)
When south goes for livestock grass seed gets the call.
Seed World 1943 : **54** : No. 6 : 8–9, 46.

The author describes several new types of grass suitable for South Texas, namely, Coastal Bermuda, new strains of Bahia grass, new strains of Dallas grass, Tift Sudan, late strains of Cattail millet, and types of Napier grass resistant to eyespot disease.

549. Saura, F. 633.2:576.312.35
Cariología de Gramíneas: géneros *Paspalum, Stipa, Poa, Andropogon* y *Phalaris.* (**Karyology of the Gramineae: genera *Paspalum, Stipa, Poa, Andropogon* and *Phalaris***).
Rev. Fac. Agron. B. Aires 1943 : **10** : 344–53.

Root tip counts were made for 11 different species, with the following results: *Paspalum proliferum* ($n = 20$, $2n = 40$); *P. intermedium* ($2n = 40$); *P. Gayanum* ($n = 10$); *Poa iridifolia* ($n = 14$, $2n = 28$); *P. lanigera* ($n = 14$, $2n = 28$); *P. resinulosa* ($n = 14$, $2n = 28$); *Stipa brachychaeta* ($2n = 40$); *Andropogon distachyum* ($2n = 40$); *Phalaris canariensis* ($2n = 12$); *Ph. coerulescens* ($n = 7$, $2n = 14$); *Ph. angusta* ($n = 7$, $2n = 14$).

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* This paper was unobtainable by the bureau, the information given above as to its contents being forwarded by the Texas Agricultural Experiment Station.

550. 633.2:581.6:575.42
LEITZKE, B. 633.32:581.6:575.42
Über Einzelpflanzenuntersuchungen im Rahmen der Gräserzüchtung.
(On individual plant investigations in the sphere of grass breeding).
Z. Pflanzenz. 1943 : **25** : 38–60.

The investigations were made during 1937–39 on a series of the most important grass and clover species with the following aims: (1) the determination of the range of variation in fresh weight, dry matter content, yield of dry matter, crude protein content and crude protein yield and whether the crude protein content was a heritable character; (2) the importance of leaf colour and type of growth as a character in selection especially as regards crude protein; (3) the importance of the proportion of leaf as a character for selection of crude protein.

All the grasses and clovers investigated showed a wide range of variation in all the characters noted. The differences in crude protein in the dry matter varied very greatly in the individual plants and was most marked in the grasses. High fresh weight and high crude protein content in the dry matter could be found combined in individual plants of both grasses and clovers. Crude protein content was found to depend, at least in part, on hereditary factors. It was not possible to define with certainty the boundary between variation and modification. There was no complete correlation between leaf colour and fresh weight, percentage dry matter, yield of dry matter, percentage crude protein or yield of crude protein. There seemed to be a tendency for the dark coloured plants to surpass the light coloured ones in fresh weight, crude protein content, yield of dry matter and crude protein yield but in some grass and clover species the reverse was found. A relatively high correlation coefficient was found for leaf colour and crude protein content in the dry matter but even here the correlation is not certain as other factors influence the content of crude protein, one of the chief being the proportion of leaf. There exist great differences in the proportion of leaf and besides this character the specific crude protein content of the plant must be taken into account. Cases frequently occur in which plants rich in leaves have a lower specific crude protein content than plants of the same species with fewer leaves.

For practical breeding purposes the variations are such that only by selection can real progress be made. Individual plants are not suitable for selection but the first selected plants are increased by vegetative means, the test for crude protein is made on the clone and is followed by further selection. Leaf colour is only a rough guide for selection and though selection for higher proportion of leaf is an important means for increasing crude protein content, here also final conclusions can only be drawn by analysis.

551. BRITTINGHAM, W. H. 633.21:581.163:581.481:581.162.5
Type of seed formation as indicated by the nature and extent of variation in Kentucky bluegrass, and its practical implications.
J. Agric. Res. 1943 : **67** : 225–64.

A detailed report on investigations into the reproduction of *Poa pratensis* is presented. Bagging experiments indicate that clones differ in their degree of self-sterility and it appears that this character is determined, in part, genetically. The ratio of polyembryonic to normal seeds is independent of the mode of pollination, and, in general, the progenies resulting from selfing and open-pollination do not display significant differences *inter se.*

The percentage of apomixis in *P. pratensis* does not appear to vary much with the origin of material but most sources are highly heterogeneous. Experiments reported in this paper indicate a greater degree of morphological variability than recorded by other authors; this is attributed to the writer's technique of germinating seeds in Petri dishes instead of in soil, by doing which many aberrant and weakly growing plants may be detected. A barely significant negative correlation occurs between the degree of morphological variability and the incidence of polyembryony. It is possible that the populations studied consisted of two types, one showing a highly significant correlation in this respect, and the other no significant correlation.

Morphological variability and percentage survival are inversely associated and it was found that the former character was more marked in the progenies of polyembryonic seeds than in normal offspring. If one of the components of a polyembryonic seed is sexually produced, it usually germinates later than apomictic members. Since the percentage production of polyembryony is the same in different generations of an apomictically reproducing clone, it is assumed that the number of embryos per seed is subject to genetic control.

Sexual reproduction may result in the formation of "diploid", "haploid", or "triploid" offspring, the first being the most usual. The chromosome complements of these types can be determined adequately by measurements of the pollen diameters.
In conclusion, the author describes some representative families and decides that, in general, apomixis is the most frequent mode of reproduction. He points out, however, that the polymorphic nature of *P. pratensis* makes any generalization difficult. The application of these results to plant breeding is discussed.

552. NANNFELDT, J. A. 633.21:582(48)
On the polymorphy of *Poa arctica* R. Br., with special reference to its Scandinavian forms.
Symb. Bot. Upsaliens. 1940 : **4** : No. 4 : Pp. 85.
A contribution to the systematics of the species *Poa arctica* R. Br. is presented in which six subspecies are described. However the author found it impossible to divide the species as a whole into a series of distinct microspecies because of the presence of habitually apomictic biotypes that may inter-cross forming a polymorphous complex of races. The problem of vivipary in grasses is discussed at length.

553. MYERS, W. M. and
HILL, H. D. 633.22:576.356:575.14
Increased meiotic irregularity accompanying inbreeding in *Dactylis glomerata* L.
Genetics 1943 : **28** : 383–97.
Cytological investigations on the inbred progenies of several clones of *Dactylis glomerata* are reported. Chiasma frequency decreased from an average of 1·78 per chromosome to 1·71 and since significant differences were observed between two inbred progenies, it is concluded that the parent clones differed genetically in factors regulating this process. Some segregation for quadrivalent frequency occurred during inbreeding, a complex of genes probably being concerned; the average frequency of quadrivalent formation either remained stationary on inbreeding or increased.
A close correlation between the number of univalents at metaphase I, the number of lagging and dividing univalents at anaphase I, and the number of micronuclei was observed. All these aberrations increase markedly on inbreeding, the average frequencies sometimes increasing three times. Some segregation in these characters could be found but the cause of the increase is obscure and can only be attributed in part to decreased chiasma frequency.
Positive correlations were calculated between chiasma frequency and quadrivalent frequency and, in some cases, a negative correlation was found between quadrivalent frequency and the incidence of univalents at metaphase I. Negative correlations were established between all these meiotic irregularities and the percentage seed set.

554. 633.22:581.162.52:575.42
HAYES, H. K. and 633.262:581.162.52:575.42
SCHMID, A. R. 633.264:581.162.52:575.42
Selection in self-pollinated lines of *Bromus inermis* Leyss., *Festuca elatior* L., and *Dactylis glomerata* L.
J. Amer. Soc. Agron. 1943 : **35** : 934–43.
It has been found possible to select from self-pollinated lines of *B. inermis* Leyss., *F. elatior* L. and *D. glomerata* L. The strains obtained exhibited significant differences in yield and resistance to winter killing.

555. SALOMON, E. S. 633.282:576.356.5:581.04
Sorghum sudanense (Piper) Stapf tetraploide obtenido por colchicina. [**Tetraploid *S. sudanense* (Piper) Stapf obtained by colchicine**].
An. Inst. Fitotec. Santa Catalina 1940 : **2** : 13–16.
Two tetraploid plants with $n = 20$ were obtained, one by applying a 1% colchicine solution in agar to young plants and one by injecting the solution into the coleoptile. Both tetraploid plants produced large numbers of seeds which were larger than normal and gave rise exclusively to tetraploid progeny.
Meiosis in the tetraploids appeared to be normal.

556. 633.282:576.356.5:581.143
GARBER, E. 633.14:576.356.5:581.143
The rate of root elongation in diploid and tetraploid Sudan grass and rye.
Amer. Nat. 1943 : **77** : 190–92.

A comparison of root elongation rates in diploid and tetraploid strains of these two grasses has shown that the tetraploid grows quicker in Sudan grass while the converse relation holds good in the case of rye.

557. HOGG, P. G. and
AHLGREN, H. L. 633.282:581.192:575.113:575.125
Environmental, breeding, and inheritance studies of hydrocyanic acid in *Sorghum vulgare* var. *Sudanense*.
J. Agric. Res. 1943 : **67** : 195–210.

Factors influencing the content of hydrocyanic acid in Sudan grass have been investigated. Stage of maturity, degree of drought, and temperature have significant effects but no diurnal fluctuations could be demonstrated.
Natural crossing in the variety has been given a mean value of $6{\cdot}7 \pm 2{\cdot}29\%$.
Inbreeding experiments have shown that a considerable degree of uniformity can be obtained in 3–5 generations. Reduction in vegetative vigour and, still more, in seed production accompanies inbreeding, but it is thought possible that selected lines might be obtained equal in vigour to commercial strains. Hydrocyanic acid content is also determined genetically. No clear-cut dominance relations are observed in crosses and it is believed that several gene pairs are concerned whose effects are not merely additive. Heterosis does not increase the content of hydrocyanic acid.

LEGUMINOUS FORAGE PLANTS 633.3

558. HOLLOWELL, E. A. 633.321–2.483–1.521.6:575.12(73)
Registration of varieties and strains of red clover, I.
J. Amer. Soc. Agron. 1943 : **35** : 830–33.

Cumberland, formerly known as Southern Disease Resistant Blend, arose as a composite cross from Kentucky No. 101 or No. 215, Tennessee Anthracnose Resistant, and Virginia (Sandford). It is resistant to southern anthracnose and crown rot and is adapted to the southern region of the principal American red clover belt.
Midland (formerly Central Corn Belt Blend) is a composite cross of Illinois (Rahn and Letcher), Ohio (Poland strain, replaced later by Kirch and Van Fossen), Indiana (Otten), and Iowa (Emerson). It is winter-hardy, has some resistance to northern anthracnose, and is adapted to the central region of the red clover belt.

559. ATWOOD, S. S. 633.322:581.162.32
"Natural crossing" of white clover by bees.
J. Amer. Soc. Agron. 1943 : **35** : 862–70.

The behaviour of eight clones of white clover has been investigated with regard to cross-pollination frequency. A wide range of conditions from a high degree of self-compatibility to self-incompatibility was observed and the crossing obtained under semi-natural conditions was analysed statistically.

560 ATWOOD, S. S. and
SULLIVAN, J. T. 633.322:581.192:575.11
Inheritance of a cyanogenetic glucoside and its hydrolyzing enzyme in *Trifolium repens*.
J. Hered. 1943 : **34** : 311–20.

Two inbred lines of white clover giving negative and positive tests for HCN respectively were crossed together. The F_1 was shown to be HCN positive whilst the F_2 families segregated in such a way that the authors concluded that the presence of HCN was dependent on the presence of two complementary dominant genes. There was apparently no linkage between these genes or between either of them and the gene for white markings on the leaf blade.

561. Albrecht, H. R. 633.35:575.42(76.1)
Vetches . . . tailored for and by the south.
Sth. Seedsman 1943 : **6** : No. 10 : 10, 55.
Four new varieties of winter legume are described. Lafayette is a strain of *Vicia monantha* which grows well in the winter and yields a heavy seed set; Monala is an early-maturing selection of this strain. Auburn is an early selection of *V. dasycarpa* while Alabama is an early selection of *V. sativa*, distinguished by its vegetative vigour.

562. Stitt, R. E. 633.364:581.192
Variation in tannin content of clonal and open-pollinated lines of perennial lespedeza.
J. Amer. Soc. Agron. 1943 : **35** : 944–54.
Significant varietal differences have been found in the tannin content and growth habit of *Lespedeza cuneata* (Dum. de Cours) G. Don. Low tannin content is associated with low yield.

563. Hanson, C. H. 633.364:581.461:581.02
Cleistogamy and the development of the embryo sac in *Lespedeza stipulacea*.
J. Agric. Res. 1943 : **67** : 265–72.
The development of the cleistogamic flowers of *L. stipulacea* is described. It appears that the proportion of these to normal flowers is determined largely by environmental factors.

564. Hollowell, E. A. 633.366:576.16(73)
Registration of varieties and strains of sweet clover, I.
J. Amer. Soc. Agron. 1943 : **35** : 825–29.
Spanish (P.I.27, 465) is a variety of *Melilotus alba* formerly known as Madrid White; it was introduced from the Madrid Botanical Garden. Growth habit is biennial and vigorous and the seed set is both heavy and early.
Madrid (P.I.27, 474) is a variety of *M. officinalis* called Madrid Yellow, and introduced from the same locality as the preceding variety. It resembles Spanish in growth habit and earliness but is more resistant to autumnal frosts. The seed set is heavy.
Evergreen originated as a field selection in the Park farm, Ohio State University. It is a variety of *M. alba* and has a biennial, rank, and somewhat coarse habit. Blooming extends over a long period and the seed sets freely but shattering hampers the harvesting of heavy seed crops.

565. McKee, R. and
Stephens, J. L. 633.379:575.22(73)
Kudzu as a farm crop.
Fmrs' Bull. U.S. Dep. Agric. 1943 : No. 1923 : Pp. 13.
No commercial strains of kudzu have been established but individual plants exhibit a wide variation in pubescence, leafiness, internodal length and degree of vegetative vigour. It is suggested that there would be little difficulty in developing improved varieties by means of selection.

ROOTS AND TUBERS 633.4

566. Baensch, H.-U. 633.41:581.6:578.08
Methodische und vergleichende Untersuchungen über die Fleischfestigkeit von Betarüben. (**Technique and comparative investigations on the firmness of flesh of beetroots**).
Z. Pflanzenz. 1943 : **25** : 8–37.
The investigation was undertaken to determine whether the firmness of the beetroot is connected with the amount of dry matter and sugar and whether the firmness influences directly the keeping and storing qualities found. Details are given of the apparatus for measuring the firmness of flesh; it consists of a steel point inserted under pressure into the flesh in the direction of the long axis of the root. Tests of the different parts of the root showed that the firmness decreases from the outside to the centre and that the firmness at the top of the root is the greatest but this decreases at about half to three-quarters of the length of the root and then increases again slightly. Lignification and cellular structure both showed a parallel variation with the degree of firmness while turgor had a decisive effect on the character.

There was no certain correlation between firmness and dry matter content within the varieties. Other correlations tested without results were firmness/weight, dry matter content/weight, thickness of ring of vascular tissue/dry matter content and thickness of ring/degree of firmness. For breeding it would seem possible to unite high dry matter content with a lower degree of firmness and for this purpose a reduction in the degree of lignification and a decrease in the osmotic value are desired, though in the case of forage beet the latter objective may be a disadvantage if it leads to a reduction in salt content.
Finally a simple, easily used instrument for measuring firmness in breeding experiments is described. R. M. I.

567. Stevenson, F. J. 633.491:575
Potato breeding, genetics, and cytology: review of recent literature.
Amer. Potato J. 1943 : **20** : 267–79.

A general account is given of recent research on the potato. Much of the information, particularly that from articles in foreign languages, has been taken from "Plant Breeding Abstracts".

568. Hern, A. P. 633.491:575(47)
(The question of re-examining the scheme of potato breeding).
Vestnik Ovoščevodstvo i Kartofel' (Vegetable and Potato Journal) 1941 : No. 2 : 57–59.

The yield in the first tuber reproduction was found to be a very unreliable guide to the final yielding ability of a seedling. In crosses of Cobbler x Fürstenkrone, two seedlings which were discarded in the early stages on account of low yields, being retained for crossing purposes because of their pollen fertility, in later years excelled all others and gave rise to the now popular varieties Kalitinec and Komsomolec. The seedlings giving the best yields in the early years later deteriorated. The author therefore advocates that no selection should be made until the third clonal reproduction of the seedlings.

569. Tkačenko, P. I. 633.491:575.127.2
(New interspecific hybrids with a wild potato species).
Vestnik Ovoščevodstvo i Kartofel' (Vegetable and Potato Journal) 1941 : No. 2 : 93–94.

Among a great number of pollinations of *S. acaule* made without success, one produced seed. This was obtained by pollinating a young seedling of *S. acaule* with a clonally reproduced plant of Majestic. The ten seedlings obtained all resembled Majestic in type and had 48 somatic chromosomes but four of them survived frost of —3·5°C. to —4° C. which severely damaged the varieties Wohltmann and Kungla.

570. Filippov, A. S. 633.491:575.127.2:575.3
(Training the species *S. semidemissum* and its utilization for breeding).
Vestnik Ovoščevodstvo i Kartofel' (Vegetable and Potato Journal) 1941 : No. 2 : 60–66.

The species *S. semidemissum* and *S. acaule* have not been exploited to the full on account of the difficulty of crossing them with *S. tuberosum*. By growing *S. semidemissum* for 25–30 days in short days with low temperature and then crossing it with the variety Smyslovskii [Fürstenkrone], a number of hybrid seeds were obtained in 1938. The F_1 generation segregated widely in habit, flower and tuber colour, earliness, and resistance to blight and frost; all the hybrids had short stolons and are thought to offer a very fruitful field for selection. Similar crosses were made in 1940 between *S. semidemissum* and the variety Rosafolia; 12 flowers of *S. semidemissum* were pollinated and 8 berries were set, giving rise to 95 normally developed seeds, in addition to a number of deformed ones. Two stolons were removed from the mother plant and rooted in pots, so as to come into flower in the short days of September. Two flowers were then pollinated with Rosafolia and produced 17 normal seeds.
The F_1 hybrids with *S. semidemissum* were very much better than those with *S. demissum* in such qualities as starch content, tuber yield, earliness and frost resistance; their tubers however were small, the largest weighing only 80 grm. Both the yield and starch content were noticeably higher in the second tuber generation and the tubers were also larger and of a better shape. The best seedlings were back-crossed to Fürstenkrone. The back-cross hybrids were of the

cultivated type and resembled hybrids between domestic varieties. Many of them were blight and frost resistant, yielded tolerably well and matured early. All had short stolons and some had tubers of quite good shape.
The seedlings classed as blight resistant by the leaf test were grown in the field under conditions of very heavy infection and proved more resistant than the blight resistant variety 8670. About 30% of the seedlings were blight resistant and 15% withstood temperatures of −2·5° C. to −3° C.; the best resisted −5° C. The seedlings bore large numbers of tubers, up to 65 per plant, their main defect being their small size.
About 40% of the back-cross seedlings had fertile pollen; the majority of them had $2n = 54$ chromosomes; three had $2n = 52$, one had 60–62 and one 108; this last was a dwarf, formed no tubers and died. The plant with $2n = 52$ also formed no tubers. Otherwise there seemed to be no relationship between chromosome number and type of plant, fertility or resistance to frost and blight. The best seedlings have been used as parents in further crosses.

571. Ratera, E. L. 633.491:576.312.35
Número de cromosomas de algunas Solanáceas Argentinas. (**Chromosome numbers in some Argentine Solanaceae**).
Rev. Fac. Agron. B. Aires 1943 : **10** : 318–25.
Chromosome counts were made from pollen mother-cells in 14 solanaceous species belonging to 4 different genera. $n = 12$ was reported from *Solanum angustifidum* Bitter, *S. basilobum* Bitter, *S. sarachoides* Sendt., *S. argentinum* Bitter et Lillo, *S. verbascifolium* L., *S. violaefolium* Schott, *Lycium cestroides* Schl., *L. cuneatum* Dammer, *Grabowskia duplicata* Hook. et Arn., *Acnistus parviflorus* Griseb.; $n = 18$ from *S. Millanii* Buk. et Lechn.; and $n = 24$ from *S. Pocote* Hieron, and *S. Hieronymi* OK. J. G. H.

572. Tkačenko, P. I. 633.491:581.165.1:575"793"
(**A high yielding and early clone of Wohltmann**).
Vestnik Ovoščevodstvo i Kartofel' (Vegetable and Potato Journal) 1941: No. 2: p. 95.
Examination of a number of clones of Wohltmann potato revealed one which matured earlier than the rest. Both in dry and wet years the new clone has given higher yields and more starch per hectare than the ordinary Wohltmann.

573. Barham, H. N.,
Krámer, G. and 633.491:581.6
Reed, G. N. 633.492:581.6
Influence of various factors on the starch content of Kansas-grown potatoes and sweet-potatoes.
J. Agric. Res. 1943 : **67** : 395–406.
Varietal differences in the starch content of potatoes and sweet potatoes are reported.

574. Ratera, E. L. 633.491–1.524:575.127.2(82)
"Solanum chacoense" Bitter espontaneo en los alrededores de Buenos Aires. (***Solanum chacoense* Bitter, growing wild in the environs of Buenos Aires**).
Agronomía, B. Aires 1942 : **31** : 56–60.
In the opinion of the author *S. chacoense*, recorded originally from the Paraguayan Chaco, is also to be found in Argentina, in the provinces of Buenos Aires, Santa Fé and Córdoba. It is not thought that this species will be of much use in breeding for virus resistance, since those clones that withstand the attacks of virus possess few small tubers with bad flavour and are of no commercial value. J. G. H.

575. Ratera, E. L. 633.491–1.524:582(82)
Los "Solanum" aculeados de la Capital Federal y sus alrededores. (**The aculeate *Solanum* species from the Federal Capital and its environs**).
Agronomía, B. Aires 1942 : **30** : 360–68.
The following five aculeate *Solanum* species (subgenus *Leptostemonum*) from Buenos Aires and its environs are described and figured: *S. sisymbriifolium* Lam., *S. meloncillo* Par., *S. elaeagnifolium* Cav., *S. platense* Dieck. and *S. bonariense* L. J. G. H

576. Tottingham, W. E.,
Nagy, R.,
Ross, A. F.,
Marek, J. W. and
Clagett, C. O. 633.491–2.19:581.6:575
A primary cause of darkening in boiled potatoes as revealed by greenhouse cultures.
J. Agric. Res. 1943 : **67** : 177–93.

Possible causes for the production of dark pigmentation in boiled potatoes have been examined. The tendency appears to be varietal to some extent and is moreover inherited in clonal reproduction. Although the stocks examined appeared to be free of the commonly recognized diseases, the possibility of an unrecognized virus must be considered.

577. Hendrickx, F. L. 633.491–2.411.4–1.521.6:575.42(67.5)
Le Mildiou de la pomme de terre. (**Blight of the potato**).
Centre Afrique 1943 : **10** : No. 488 : p. 3.

Blight (*Phytophthora infestans*) is recorded for the first time among potatoes in the Belgian Congo. To combat the disease it is recommended that, in addition to spraying and the elimination of infected varieties, selection should be carried out in the most severely infected areas to obtain resistant varieties. Tubers from these plants only should be used for propagation and subsequent further improvement in yield and other economic features.

578. Müller, K. O. and
Sellke, K. 633.491–2.7–1.521.6:575
Über die Aussichten der Züchtung von "käferfesten" Kartoffelsorten. (**On the prospects for breeding "Colorado beetle resistant" potato varieties**).
Mitt. Biol. Reichsanst. Landw. 1941 : **64** : 10–23.
[From Gartenbauwiss. 1942 : **17** : p. (20)].

Solanum demissum ($n = 36$) being the only resistant species that will cross with *S. tuberosum* ($n = 24$), was used for hybridization. The F_1 showed a great range of variation, the mortality of the larvae on them ranging from 5% to 95%; a segregation was hoped for in the F_2 but instead the range was reduced to 5-75%. As the back-cross showed no worse results than the F_2 it is concluded that, in the crossing, the resistant gene is carried exclusively by the egg cell and not by the pollen. This is borne out by the cytology of the hybrids. After a few generations the hybrids reduce their chromosome number to a regular $2n = 48$ and become more and more like *S. tuberosum*. The *demissum* chromosomes, and with them the resistant genes, are eliminated. There are, however, rare cases in which the desired combination occurs.
It is suggested in conclusion that progress may be made by selection for regeneration capacity within *S. tuberosum*. It has been shown that there exist considerable differences in this character among potato varieties. R. M. I.

579. Schwartz, M. 633.491–2.7–1.521.6:575(43)
Die Kartoffelkäfer-Forschungsstation der Biologischen Reichsanstalt in Kruft. (**The Colorado beetle research station of the Biologische Reichsanstalt in Kruft**).
Mitt. Biol. Reichsanst. Landw. 1941 : **64** : 5–10.
[From Gartenbauwiss. 1942 : **17** : p. (19)].

A new research station for work on the Colorado beetle has been opened at Kruft and work began in 1940 with the author as Director. The biological behaviour of the pest, the factors for its natural limitations and the testing of the methods of direct and indirect control are studied at the station. R. M. I.

580. Rieman, G. H. and
McFarlane, J. S. 633.491–2.8–1.521.6:575.12
The resistance of the Sebago variety to yellow dwarf.
Amer. Potato J. 1943 : **20** : 277–83.

The potato variety Sebago exhibits a high degree of field resistance to the yellow dwarf virus. This character is inherited in the progeny of the cross Sebago x Hindenburg.

581. Richmond, T. R. 633.51:575.061.6:581.6
Inheritance of green and brown lint in Upland cotton.
J. Amer. Soc. Agron. 1943 : **35** : 967–75.

The genetical behaviour of lint pigmentation has been studied, using the following varieties: Texas Green Lint, Nankeen (dark brown lint), Texas Rust (light brown lint), Higginbotham (light brown lint) and a normal white-linted variety. Pigmentation of the first three varieties is conditioned by a single gene which is incompletely dominant to white. The genes for Texas Rust and Nankeen are allelic and appear to be independent of Texas Green Lint and Higginbotham which are also independent of each other. An association was observed between the green and brown lint genes and a reduction in the weight of fibre per unit length.

582. Humphrey, L. M. and
Tuller, A. V. 633.51:575.12:578.08
Mejoras en la técnica de hibridación del algodón. (**Improvements in the technique of hybridization in cotton**).
Rev. Fac. Nac. Agron., Colombia 1943 : **5** : No. 20 : 37–41.

The method described consists in placing portions of drinking straw, containing the unopened anther of the pollen parent, over the emasculated flower and attaching it with copper wire. No further operation is then necessary till harvest.

583. Neely, J. W. 633.51:575.172.3:575.116.1:575.175.11
Relation of green lint to lint index in Upland cotton.
J. Agric. Res. 1943 : **66** : 293–306.

The genetical relationship between green lint and lint index has been investigated by crossing Arkansas Green Lint (low lint index and green lint) with Half and Half (high lint index and white lint). Satisfactory evidence was obtained for supposing that green lint is determined by a single incompletely dominant gene. Although it is probable that lint index is controlled by a number of quantitative genes, the marked association of green lint with low lint index could not be explained adequately on the assumption of linkage between the green lint gene and some of the quantitative genes.

It is believed that this association must be attributed to "spurious pleiotropy", the pigmentation determined by the green lint gene exercising a secondary inhibition on fibre development. Anatomical evidence is adduced in support of this suggestion.

584. 633.51:575.42(75.8)
"Tifton Station 21". A new cotton for south Georgia.
Mimeogr. Paper Ga Coastal Plain Exp. Sta. 1942 : No. 15 : Pp. 2.

Tifton Station 21 is a new cotton variety which originated as an individual plant selection from Dixie Triumph. It is a vigorously growing type suited to conditions in southern Georgia.

585. Smith, W. S.,
Martin, W. J. and
Pearson, N. L. 633.51:581.6
Relationship of certain characteristics of seed cottons to ginning.
J. Agric. Res. 1943 : **66** : 249–60.

Significant varietal differences have been observed in the time and energy required for ginning American upland cottons. The effects of fuzz percentage, lint percentage and seed size on ginning efficiency are discussed.

586. Conrad, C. M. and
Neely, J. W. 633.51:581.6:575.116.1:575.061.6
Heritable relation of wax content and green pigmentation of lint in Upland cotton.
J. Agric. Res. 1943 : **66** : 307–12.

The genetics of wax content have been studied in the cross Arkansas Green Lint x Half and Half. A close association was found to exist between the green lint gene and the factors determining high wax content. Some of the white linted F_3 progeny of the cross had a wax content of 0·66% in contrast to the 0·48% of the original white parent; the green linted forms had a wax content ranging from 12·64% to 15·04%.

Although the evidence considered does not exclude the possibility of linkage, it is believed that the association of the two characters is to be attributed to the pleiotropic effects of one principal gene.

587. GUBIN, A. T. 633.52:581.162.32
(The pollination of fiber flax by honey bees).
Proc. Lenin Acad. Agric. Sci. U.S.S.R. 1942 : Nos. 3–4 ; 30–32.
Flax is shown to be largely entomophilous; its nectar production however is lower even than that of red clover and about 15 families of bees, previously conditioned for flax flowers, are required to ensure adequate pollination of a plot of say 50 hectares. When this was done, material increases in both number and size of seed were recorded.

588. SINNOTT, E. W. and BLOCH, R. 633.528.2:581.14:581.47
Development of the fibrous net in the fruit of various races of *Luffa cylindrica*.
Bot. Gaz. 1943 : **105** : 90–99.
Varieties of *L. cylindrica* exhibit differences in the development and configuration of the fibrous net.

SUGAR PLANTS 633.6

589. INGRAM, J. W., BYNUM, E. K., MATHES, R. and HOLLOWAY, T. E. 633.61–2.7–1.521.6:575
Report on research on sugarcane-insect control by the Houma, La., Laboratory of the U.S. Bureau of Entomology and Plant Quarantine during 1942.
Sug. Bull., N.O. 1943 : **21** : 208–11.
Sugar cane varieties have been selected for use as breeding stock resistant to the cane borer. Most of the Turkestan varieties and N.G.251 transmit resistance to their progenies.

590. ABBOTT, E. V. 633.61–2.8–1.521.6(76.3)
The present situation with respect to chlorotic streak in Louisiana.
Sug. Bull. N.O. 1943 : **21** : 207–08.
Varietal susceptibility of sugar cane to chlorotic streak has been investigated.

591. CROIZAT, L. 633.682:582(8)
Preliminari per uno studio del genere "Manihot" nell' America meridionale. **(Preliminary notes for a study of the genus *Manihot* in South America).**
Rev. Argent. Agron. 1943 : **10** : 213–26.
The author regards the number of species established in the genus by Pax as being excessive and the number accepted by Ciferri as too few. A review is here given of the species, with indications of those that are considered to be synonyms.

STIMULANTS 633.7

592. AGUIRRE, E. F. 633.71:575(72.91)
Magnifica labor que realiza la Estación Experimental del Tabaco. **(The magnificent work that is being carried on by the Tobacco Experiment Station).**
Agronomia, Habana 1943 : **3** : p. 148.
The Tobacco Experiment Station in Cuba is distributing selected seed of the Criolla variety to the growers.

593. MALLAH, G. S. 633.71:576.356.2
Inheritance in *Nicotiana Tabacum*. XVI. Structural differences among the chromosomes of a selected group of varieties.
Genetics 1943 : **28** : 525–32.
An analysis of the chromosome types of fifteen horticultural varieties of *N. Tabacum* indicated that reciprocal translocations were to be found in four types. The varieties Apolo-I, Ceniza and Huadquina each contained a single reciprocal translocation relative to the standard variety Purpurea; whilst one variety, Cuba, possessed three such translocations. The mosaic resistant variety Holmes Samsoun is considered to have one pair of *Tabacum* chromosomes replaced by a pair of *glutinosa* chromosomes.

594. Bradley, M. V. and Goodspeed, T. H. 633.71:581.04:576.356.5
Colchicine-induced allo- and autopolyploidy in *Nicotiana*.
Proc. Nat. Acad. Sci., Wash. 1943 : **29** : 295–301.
The present state of knowledge on the origin of presumed amphidiploid species of *Nicotiana* is reviewed. A list is given of the following amphidiploids which have been obtained by colchicine treatment of the hybrids: *N. excelsior* x *N. velutina*, *N. glutinosa* x *N. glauca*, *N. glutinosa* x *N. silvestris*, *N. glutinosa* x *N. Tabacum*, *N. rustica* x *N. Tabacum*, *N. suaveolens* x *N. alata*, *N. suaveolens* x *N. Sanderae*, *N. Tabacum* x *N. glauca*, *N. Tabacum* x *N. silvestris*, *N. alata* x *N. Sanderae*, *N. maritima* x *N. plumbaginifolia*, *N. otophora* x *N. Setchellii*, *N. paniculata* x *N. solanifolia*, *N. rustica* x *N. paniculata*, *N. Tabacum* x *N. otophora*, *N. Benthamiana* x *N. Debneyi*, *N. maritima* x *N. velutina*, *N. velutina* x *N. suaveolens* and *N. velutina* x *N. rotundifolia*.
Various techniques of colchicine treatment are described and a brief account is given of the meiotic behaviour of representative amphidiploids.

595. 633.71–2.411.4–1.521.6:575
Resistant tobacco seed now available.
Ext. Fm News 1943 : **29** : No. 3 : p. 4.
Four varieties resistant to black-shank have been released by the Tobacco Branch Station of the North Carolina State College. It is reported, also, that lines resistant to Granville wilt have been established.

596. Bullock, J. F. and Moss, E. G. 633.71–2.411.4–1.521.6:575.12(73)
Strains of flue-cured tobacco resistant to black shank.
Circ. U.S. Dep. Agric. 1943 : No. 682 : Pp. 9.
A breeding programme has been initiated to produce flue-cured tobacco varieties resistant to black shank (*Phytophthora parasitica* var. *Nicotianae*). Four new types have been released, all of which derive their resistance from the cigar-wrapper variety 301. Oxford 1, derived from 301 and Virginia Bright Leaf, is similar to the latter variety while Oxford 2 is closely related to Oxford 1, but has smaller and rougher leaves. Oxford 3 is derived from 301 and White Stem Orinoco; it resembles the latter variety in general appearance. Oxford 4, from 301 and Warne, is similar to Warne but has leaves less deep in colour.
All these varieties need further improvement with respect to quality and uniformity.

597. 633.71–2.8–1.521.6:575(46)
Tobacco varieties resistant to ordinary mosaic.
Int. Rev. Agric. 1943 : **34** : 17M–18M.
An account is given of the production at the Santiponce Station, in Seville, of three mosaic-resistant varieties of tobacco by crossing the susceptible varieties Valencia Alto and Filipino with the resistant variety Colombia (Ambalema) from Colombia. The breeding work is being continued to improve the yield and quality of the new varieties.

598. Gerstel, D. U. 633.71–2.8–1.521.6:576.354.4:575.127.2
Inheritance in *Nicotiana tabacum*. XVII. Cytogenetical analysis of *glutinosa*-type resistance to mosaic disease.
Genetics 1943 : **28** : 533–36.
In the hybrids made between the mosaic resistant *N. Tabacum* variety Holmes Samsoun (which possesses one pair of *glutinosa* chromosomes) and the non-resistant variety Purpurea, the *Tabacum* and *glutinosa* chromosomes remain unpaired. It is shown that the mosaic resistant factor is borne on one of the chromosomes of this non-conjunctional pair, and as a result of various crosses, it is concluded that heterozygous plants should be used as pollen parents in transferring mosaic resistance to other *Tabacum* varieties.

599. Schultes, R. E. 633.79:581.6(86)
Plantae Colombianae IV. Una planta estimulante del Putumayo. **(Colombian plants IV. A stimulant from Putumayo).**
Rev. Fac. Nac. Agron., Colombia 1943 : **5** : No. 20 : 59–79.
A description is given of the species *Paullinia Yoco*, a plant of the family Sapindaceae, used in Colombia and adjacent areas as a stimulant on account of the relatively high content of caffeine in its bark.

CONDIMENTS 633.84

600. RUDORF, W. 633.842:575(43)
Deutscher Speise- und Gewürzpfeffer. (**German sweet pepper and seasoning pepper**).
Forschungsdienst 1943 : **15** : p. 57.
At the Erwin Baur Institute for Research on Breeding and its Ladenburg branch, promising experiments have been conducted for some years past on the cultivation and breeding of seasoning and sweet pepper, the object being to convert this plant, whose exceptional wealth of forms is indicated, into a domestic cultivated plant for Germany. The aims in breeding are described and it is possible that in a few years they may be attained.

OIL PLANTS 633.85

601. ANDRÉ, É. and
KOGANE-CHARLES, M. 633.853.49:575.42(44)
Sur la possibilité d'accroître la production d'huile des cultures de colza. (**On the possibility of increasing the production of oil from colza crops**).
C.R. Acad. Sci. Paris 1942 : **214** : 636–38.
In order to increase the value of the colza crop, it is recommended that the following characters should be selected: a high proportion of seeds maturing at harvest time, fruits with a low dehiscence value, large seeds, and seeds with a high percentage oil content.

602. 633.854.54:576.16(76.4)
Texas flax to extend northward to Waco.
Sth. Seedsman 1943 : **6** : No. 11 : p. 20.
Norsk is a new variety of linseed, characterized by rust resistance, high oil content and early maturing; it is not cold resistant.

603. ARNY, A. C. 633.854.54–2–1.521.6:581.6:575.12(77.6)
Flax varieties registered, I.
J. Amer. Soc. Agron. 1943 : **35** : 823–24.
Biwing (a selection from Bison x Redwing) yields well and resembles Redwing in height and rust susceptibility. It approaches Bison in 1000 seed weight and degree of pasmo infection. Redson, derived from the same parents, gives similar yields to Biwing. It resembles Redwing in height, date of maturity and bushel weight and Bison in 1000 seed weight, iodine number of oil, and rust and pasmo susceptibility.

604. ETCHECOPAR, J. A. and
FOULCAULT, S. E. 633.854.78:581.6:581.02
Influencia de épocas de siembra en las características cualitativas y cuantitativas del fruto, en variedades y selecciones de girasol, en la Estación Experimental de Pergamino. (**Influence of sowing dates on the qualitative and quantitative characteristics of the fruit in sunflower varieties and selections at the Pergamino Experimental Station**).
"Granos" Semilla Selecta, B. Aires 1941 : **5** : Nos. 4, 5 and 6 : 3–10.
The sunflower varieties Mammoth Russian and Giant and the selections Klein and De Simoni were sown at 9 different dates. Significant differences were observed in seed quality and yield in the different crops but differences between the varieties were also evident. Mammoth Russian was the best in seed and oil percentage, number of fruits per head and number of fertile fruits, while Giant had the highest weight of 1000 fruits.

RUBBER PLANTS 633.91

605. *KUPCOV, A. I. 633.913:575(47)
(**Preliminary results of breeding tau-saghyz**).
Proc. Lenin Acad. Agric. Sci. U.S.S.R. 1942 : Nos. 11–12 : 18–23.
The progress made in the breeding of *Scorzonera tau-saghyz* is reviewed and the need for improvement in growth rate, seed yield and disease resistance is indicated. Up to the present, few permanent improvements in any of these respects have been achieved. Some increase in root size is reported but no corresponding increase in rubber content.

* A full translation of this paper is on file at the Bureau.

Six varieties of the species are now recognized and the large roots of the forms from Djelagan-Ata and Leontevka and the early flowering habit of the form at Kainar-Bastau are thought worthy of mention.
A correlation has been found between disease susceptibility and the onset of flowering.
Occasional giant forms also occur and may be useful for breeding purposes.

606. MYNBAEV, K. M. 633.913:575(47)
(New methods of breeding of *koksaghyz*).
Proc. Lenin Acad. Agric. Sci. U.S.S.R. 1942 : Nos. 1–2 : 24–32.

Kok-saghyz being cross-pollinated, it is thought that the improvement to be expected from ordinary mass or individual plant selection would be too slow. The method proposed consists of picking the seeds formed at different periods of the flowering season separately and growing them on separately. The different lots, arising from seed that had matured at different seasons, differed in root weight and in rubber content; the former varied from 1 kg. to 8 kg. and the latter from 0·4% to 2·43%. The seeds formed in the latter part of the summer were larger and germinated better and also gave rise to the best progenies. For breeding stations the best results are obtained when the individual plant progenies are kept separate, whereas mass selection on the above lines is recommended for collective farmers.
Differences in size and germinating capacity were observed in the seeds from the different whorls of flowers in the inflorescence. The outer whorls gave rise to progenies with higher root yields and rubber contents than those from the inner florets.
Selection in the first year plants is based mainly on vigour of growth, size of root and rubber content. In the second year of growth selections can be made for winter-hardiness, disease resistance and freedom from summer dormancy. It is thought that in the second year the progeny from the earlier maturing seeds will be the most productive, since the mother plant loses its vigour as the season progresses. The plants which remain alive longest give the highest yields, so the very early flowering individuals should not be selected, as they probably represent types that mature too early. The plants that show the best combinations of vigour, root size and rubber are reproduced vegetatively in the greenhouse, in such a way that 500–600 individuals will be obtained in the following spring from each root. When the temperature has risen sufficiently in the spring (to not less than 14° C.) the vegetative and seed progenies of each root are planted out together at a spacing of 25 cm., with 50 cm. between the rows, seed being taken from the seedlings and the clones separately. In each lot the seed is gathered at the same period as it was gathered from the mother plant. About 2800 seeds can be obtained from each plant so that if 500 clonal plants were obtained from the original mother plant, they will give a total of 1,000,000 seeds or about 500 grm., enough to sow half a hectare, or with transplanting 2 ha. The seed progeny are again subjected to selection.

607. *POPOV, G. I. 633.913:575(47)
(The influence of cultivation and management on the anatomy of the kok-saghyz root).
Proc. Lenin Acad. Agric. Sci. 1942 : No. 11–12 : 14–17.

It is reported that anomolous secondary thickening, absent in the roots of wild plants of *Taraxacum kok-saghyz*, may appear under the influence of cultivation. In these plants, supplementary cambial arcs are laid down in the cortical zone of the root and, since lactiferous tissue is one of the products of its activity, an increase in the percentage rubber content may result. Three selections, No. 8, No. 10 and "New Root" have been made. These forms have been propagated by root sprouts and, through this method, it is believed that more vigorous plants have been obtained.

608. BARANOVSKY, A. L. and
MAKAREVITCH, T. N. 633.917:575(47)
(Spindle tree *Euonymus europea* a valuable gutta-percha bearing plant).
Proc. Lenin Acad. Agric. Sci. U.S.S.R. 1942 : Nos 3–4 : 23–25.

Euonymus europaea L. has been found to contain up to 13·5% of gutta percha in the root cortex and up to 10% in the stem cortex. This species is regarded as a more promising subject for breeding than *E. verrucosa* Scop.

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* A full translation of this paper is on file at the Bureau.

609. Jakovlev, P. N. 634.1/7:575.257
[To the memory of I. V. Michurin (on the fifth anniversary of his death)].
Plodovo-Jagodnye Kul'tury (Fruit Crops) 1940 : No. 4 : 3–8.

The outstanding work of Michurin, which the author discusses, was the production of fruit varieties with qualities superior to those of their predecessors and able to be grown in climates and environments where their predecessors could not be grown. These results were achieved not only by sexual but also by vegetative hybridization, in particular, by the method of "mentors". The whole technique of vegetative hybridization arose from the belief which Michurin, like Darwin, held, that there is no fundamental difference between somatic and reproductive cells, and that, therefore, vegetative as well as sexual hybridization can be applied to the plant organism in order to guide its development and modify its qualities and form in the direction desired. It is then pointed out that, whereas ordinary hybridizers, believing in the immutability of the genes and denying the influence of environment, sought to attain their ends by effecting sexual union between varieties or more or less remotely related plant species, Michurin produced hybrid seedlings only as a preliminary to their subsequent modification by vegetative hybridization; in his hands, the importance of parentage and nature was diminished and that of environment and nurture increased. Refuting Michurin's detractors, who sought to deprive his work of any scientific interest by saying that he was nothing more than a practical and experienced gardener with a knack of "bringing off" hybrids between plant species that happened to come his way, the author maintains that Michurin not only gave to the community many valuable types of fruit but contributed to the understanding of genetics and plant breeding, achievements which, by reason of the methods employed in their attainment, "reveal him as a true follower of Marx and Darwin". I. Z.

610. 634.1/7–1.524:575.12
Michurin, I. V. 634.8:575"793":575.12
(To fruit-growers of the Urals and Siberia).
Plodovo-Jagodnye Kul'tury (Fruits Crops) 1940 : No. 4 : 9–11.

The author describes a method of acclimatizing to the conditions prevailing in the Urals and Siberia, fruit varieties originating in those parts of Russia west of the Urals and in Europe where the climate is less severe. In the case of orchard fruits the procedure recommended is as follows. The flowers of a wild variety, which grows locally and is hardy, are fertilized with pollen from a western or foreign variety the qualities of which it is required to introduce into the local varieties. The progeny of this union is, in its turn, also pollinated by a variety from afar. The resulting hybrid, it is claimed, can compete with the foreign variety as regards quality, and possesses the robustness and hardiness of the local variety. Because the seedlings have been acclimatized to local conditions from the earliest stages of their growth, the combination of characters indicated above becomes their permanent possession. In connexion with the procedure described, it is asserted that, among the characters present in the parents, those will predominate in the hybrid which are most favoured by the environment in which the hybrid is to be grown, and that the maternal parent will more completely transmit its characters than the paternal.
During a period of many years, the author has observed that hybrid vines grown from seed planted early in spring develop slowly and mature late, while those grown from seed planted late in spring have the opposite characters which, with the further development of the vine, become permanent; especially is this the case when the parent vines, even if belonging to one species, are grown in widely separated regions. The author expresses the belief that his observations may enable the vine to be grown not only in the Tambov province but also in the Urals and Siberia, and that they may, perhaps, be found applicable also to kinds of fruit other than the vine. I. Z.

611. Usatov, S. P. 634.1/7–2.111–1.521.6:575(47)
(Fruit growing in the north).
Plodovo-Jagodnye Kul'tury (Fruit Crops) 1940 : No. 4 : 80–81.

From his experience of 32 years of fruit growing in the north of Russia, the author concludes

that the surest method of extending fruit growing northwards is to raise the fruit from seed in the locality in which it is to be acclimatized and then propagate it by grafting on to any hardy stock which is growing in the locality. He intends also to cross the best local varieties which he has already raised, with varieties brought from the south, and to select the best resulting seedlings. The author cites some actual examples of successful fruit growing so far north of Kirov as 130 km., and also in the Kajski region of the Kirov Province. Apples, pears, plums, cherries, apricots, gooseberries, currants, raspberries and strawberries have all been grown in these northern parts. I. Z.

612. Michurin, I. V. 634.1/7–2.111–1.521.6:575.12(47)
(How to rear fruit trees in the Urals).
Plodovo-Jagodnye Kul'tury (Fruit Crops) 1940 : No. 4 : 12–14.

It is not enough to transfer bodily to the Urals a "ready-made" tree or bush-fruit variety in the form of a young tree or bush, even if it has been growing in conditions which are similar to those in the Urals; before a variety can be considered as truly acclimatized (and not merely naturalized) to new conditions of soil and climate, it must be reared from seed under those conditions. Before describing the method of rearing the seedlings, the author explains that a seed from a cultivated fruit variety does not necessarily give rise to wilding fruit of poor quality and small size; the characters are determined by the variety from which the seed was obtained, and by the care and attention bestowed upon the seedling during its development from seed until fruit-bearing. The seedlings of the variety Antonovka, for example, originating from a wild woodland type, usually exhibit characteristics of their wild ancestry, while those of Bellefleurekitaika, Čelebi-alma and its hybrids, all the Anise varieties, Skrižapeli, and the Crimean Synap varieties, if well cultivated, produce fruit which is consistently good but varies in taste according to the climate and soil in which the seedlings have been grown. If warm weather, sufficient moisture and, above all, a mild spring and summer prevail during the first year of the seedlings' life, the cultivated qualities desired are brought out in them; but a cold, dry, windy spring and summer inevitably cause among them some measure of reversion to the wild type. Though a fertile soil may encourage good fruit in a proportion of the seedlings, it will also diminish their hardiness and robustness. The inculcation of these characters is best served by growing the seedlings in soil which is somewhat poor in heart and inclined to dryness. Growing the seedlings in a situation facing west (but not east or south), besides ensuring shelter, encourages flowering to take place late in spring when there is little danger from morning frosts. In the third spring, the seedlings which have proved hardiest and are the best in outward appearance are selected for further improvement, and at the beginning of fruit-bearing the final selection is made according to the quality of the fruit. It should be remembered that the first fruits are often hard to distinguish from their wild prototypes and that they improve only during a period of years. The selected seedlings are now ready to be propagated. Cuttings of them are grafted on young stocks, not above two years old, of hardy wild species raised locally. The seedlings are next further improved by hybridization; their flowers are fertilized by pollen from varieties brought from outside the locality, which have the characters it is required to introduce into the local seedlings. The pollen parent-trees to be used in this procedure are raised in special tubs, baskets or other containers which can be moved under cover for the winter. The hybrid seedlings resulting from this sexual crossing will possess both the necessary hardiness of the local varieties and the refined qualities of those grown elsewhere. I. Z.

613. Trenkle, R. 634.1–2.111–1.521.6:581.165.71
Beitrag zur Unterlagen- und Stammbildnerfrage. Klarstellungen. **(Contribution to the question of stocks and stem-builders. Elucidations).**
Dtsch. Obstbau 1942 : **57** : 3–9.
[From Gartenbauwiss. 1942 : **17** : (9)–(10).

The importance of frost resistant stem-builders was shown by the effects of the severe winter of 1939-40. Practical suggestions are given for increasing the frost-resistance of fruit trees. Only diploid, frost-resistant apple and pear varieties should be used for breeding hardy rootstock seedlings.

614. Möckel, W., Wolf, J. and Degen, U. 634.11:577.16:575.22(43)
Weitere Untersuchungen über den Ascorbinsäure- und Vitamin C-Gehalt deutscher Apfelsorten. (**Further investigations on the ascorbic acid and vitamin C content of German apple varieties**).
Gartenbauwiss. 1942 : **17** : 176–85.

The ascorbic acid contents of 80 varieties of apple grown in Germany have been determined and, in most cases, the total vitamin C value. A discussion of the relative importance of ascorbic and dehydroascorbic acids is included together with some account of the effects of locality and season on the yield of this vitamin.

615. Hülsmann, B. 634.11:581.165.711:575.22
Veredlungsversuche auf verschieden stark bedornten Abrissen der Apfelunterlage Ketziner Ideal. (**Experiments on grafting on cuttings of the apple stock Ketziner Ideal with various degrees of thorniness**).
Gartenbauwiss. 1942 : **17** : 171–75.

Considerable variation in the thorniness of this variety is recorded, both excessively thorny and thornless types being known. It is shown that some of this variation is determined by conditions of growth but that cuttings tend to maintain the degree of thorniness found when they were detached. The efficiency with which grafts can be made and the size of the developing scions depend at first on the degree of thorniness, but significant differences in this respect do not persist.

616. Michailov, A. J. 634.11–2.111–1.521.6:575(47)
(**Fruit-growing in the Karelian-Finnish S.S.R.**)
Plodovo-Jagodnye Kul'tury (Fruit Crops) 1940 : No. 5 : p. 102.

The first attempts at fruit-growing in the present Karelian-Finnish S.S.R. began in 1935, and several nurseries have since been established. At one of them, two apple varieties have been evolved by means of selection from seedlings, and the fruit of one of the varieties has a very good taste. A few trees exist 25 to 60 years of age, some of which, on account of their hardiness and fruit of good taste, are of great interest to plant breeders. I. Z.

617. Stepanov, P. A. 634.11–2.111–1.521.6:575(47)
(**A half century of work by a disciple of Michurin, A. I. Oloničenko**).
Plodovo-Jagodnye Kul'tury (Fruit Crops) 1940 : No. 5 : 115–17.

Since 1894, when he began to establish fruit-growing in Siberia, Oloničenko produced several varieties of apple, eight of which are described in the present article. One of these, "Poljarnoe", [Polar], deserves special mention. It was reared from seed obtained at an orchard in the Sparrow Hills near Moscow. The seeds were selected from the best but typical specimens of fruit belonging to the summer variety of "Arkad dymčatyi", which is the only tree in Eastern Siberia bearing large fruit and growing easily in standard form. When the seedlings came into bearing, their fruit was small, of somewhat poor quality, and not typical. But when they were grafted on the Siberian crab and planted on newly ploughed clayish soil, the fruit grew better in all respects. The trees themselves could withstand 60° C. of frost and suffer no more than at the very tips of the shoots, and sometimes not even that much. I. Z.

618. Dubovik, N. V. 634.11–2.111–1.521.6:575–181.13(47)
[**A weeping form of the Chinese apple (*Malus prunifolia*)**].
Plodovo-Jagodnye Kul'tury (Fruit Crops) 1940 : No. 5 : p. 109.

Malus prunifolia f. *pendula* is recommended as a dwarfing stock for scions grown in northern latitudes. Both this variety and *M. pumila* may be of value in breeding types well adapted to cold climates.

619. Jakovlev, L. I. 634.11–2.111–1.521.6:576.16
(**The Baškirskiĭ Krasavec apple**).
Plodovo-Jagodnye Kul'tury (Fruit Crops) 1940 : No. 5 : p. 75.

The good points of an apple variety, Baškirskiĭ Krasavec, are given in this article. It is more winter-hardy than Antonovka obyknovennaja and Koričnoe polosatoe, though only slightly less so than one of Michurin's varieties, Kitaika zolotaja rannjaja. Its yields are high and well

maintained from year to year. It comes into bearing earlier than most varieties, only Taežnoe being able to compete with it; both these were observed to flower in the nursery on one-year-old trees. Its fruit keeps until February or even May. It is a variety which should be tried out in parts neighbouring on the Baškir A.S.S.R. and particularly in the provinces of Kirov, Sverdlovsk, Čeljabinsk and others where the climate is severe. I. Z.

620. Isely, D. 634.11–2.7–1.521.6:575"793"
Early maturing varieties in codling moth control.
J. Econ. Ent. 1943 : **36** : 757–59.

Early apple varieties, such as Transparent and Duchess, can be grown quite free from codling moth injury in north western Arkansas if sufficiently isolated from the late varieties. This is because the fruit can be picked in June and July by the time the larvae of the second generation begin to hatch. It is therefore recommended that the early varieties be grown more widely, especially in home orchards where spraying is inadequate.

621. Börner, C. and Gollmick, F. 634.11–2.7–1.521.6:575.11
Blutlausimmune Naumburger Edelapfelzüchtungen. (**New cultivated apple varieties resistant to woolly aphis bred at Naumburg**).
Angew. Bot. 1943 : **25** : 144–49.

By means of the authors' histological method it was shown that immunity to woolly aphis is present in two strains of *Malus baccata* and in one strain each of *M. coronaria*, *M. orthocarpa* and *M. pumila* and in the three cultivated apples Nordspähers, Ontario, and Harberts Renette. Crossing experiments show that there is no difficulty in transferring the gene for immunity to other cultivated strains of apples by means of crosses with such immune parents as Nordspähers and Ontario. R. M. I.

622. Makarov, D. D. 634.13:581.162
(A pear tree producing three crops of fruit a year).
Plodovo-Jagodnye Kul'tury (Fruit Crops), 1940 : No. 5 : 113–14.

A pear tree is described which flowers three times during the summer, each flowering giving rise to a separate crop of fruit; the fruit of the first crop ripens in July, the second crop in September and the third in December.

623. Hülsmann, B. 634.14:581.165.711:582
Morphologische Beobachtungen an Unterlagenquitten aus Wageningen. (**Morphological observations on the Wageningen quince stocks**).
Gartenbauwiss. 1942 : **17** : 201–10.

The morphology of the Wageningen series of quince stocks established by Sprenger is briefly described and the various forms compared to similar EM types. It is pointed out that corresponding forms may not necessarily be genetically related.

624. Wenzl, H. 634.2–2.19
Untersuchungen über die Kräusel- (Sternflecken-) Krankheit von *Prunus armeniaca* und anderen Prunaceen. (**Investigations on the crinkle disease of *P. armeniaca* and other *Prunus***).
Phytopath. Z. 1941 : **13** : 588–623.
[From Gartenbauwiss. 1942 : **17** : (22)–(23)].

A disease is described which resembles the "crinkle" disease of *Pelargonium* and which attacks apricot and other *Prunus* trees in south east Germany. Investigation showed that it is not a virus but a physiological disease connected with excessive branching. R. M. I.

625. Smith, C. O. and Cochran, L. C. 634.22–2.19:575.11
A noninfectious heritable leaf-spot and shot-hole disease of the Beaty plum.
Phytopathology 1943 : **33** : 1101–03.

A disease of the Beaty plum is described in which the leaves develop translucent flecks which later turn brown and drop out leaving a shot-hole effect. Since this aberration cannot be transmitted by budding on to other varieties or on to healthy seedlings of the same variety, it is concluded that it is probably determined genetically.

626. 634.23–2.111–1.521.6:575(43)
SCHMIDT, M. 634.23–2.421.6:575
Forschungsaufgaben der Züchtung bei Kirschen. (**Experimental problems in cherry breeding**).
Dtsch. Obstbau. 1942 : **57** : 41–46.
[From Gartenbauwiss. 1942 : **17** : (18)–(19)].
Details are given of the work on breeding cherries at the Kaiser Wilhelm Institute for Genetical Research and the Erwin Baur Institute, Müncheberg, whose objects are to increase the certainty of yield and the quality of the fruit, which includes resistance to frost and diseases. The prospects for breeding for frost resistance are less favourable for the sweet than for the sour cherry, as during the winter 1939–40 several varieties of the latter proved to be resistant and can be used for crossing without having to resort to the use of wild species.
Resistance to *Monilia* is an important problem and by the use of a suitable method of infection the author has been able to investigate a number of cultivated races of cherry and to show that there exist some sweet cherries that are practically resistant, whereas equally resistant forms have not been found among the sour cherries. From the cross sweet x sour cherries some hybrids resistant to *Monilia* were obtained but an easier more promising line is the selection of seedlings of English morello by means of artificial selection. The author deals with other parasites of the cherry, discusses the importance of breeding for self-fertility as a positive factor in securing a reliable yield and finally gives an account of some satisfactory breeding results for improved quality. R. M. I.

627. CUNI, L. 634.25:575(45)
Cómo se ha iniciado el estudio de las variedades de melocotonero en el Véneto. (**How the study of the peach varieties in Veneto has been started**).
Agriculture, Madrid 1943 : **12** : 291–92.
A brief history of peach cultivation in Italy is given. The American varieties imported after the last war have been largely superseded by varieties raised locally, some by artificial hybridization, some by spontaneous crossing, others by mutation. Standards have been laid down for establishing the identity of the varieties; these are based on characters of the fruit and stone, flavour, period of ripening and resistance to diseases and pests.

628. KRUG, C. A. and
BACCHI, O. 634.3:576.356.5:575
Triploid varieties of citrus.
J. Hered. 1943 : **34** : 277–83.
A review is presented of citrus cytology followed by an account of the authors' work particularly on the Tahiti and Bearss limes which they have shown to be triploids. The morphological and cytological characteristics of these two varieties are given in detail and attention is drawn to the importance of triploidy in citrus breeding.

629. REIG FELIÚ, A. 634.3:581.6
Análisis cuantitativo de las esencias del fruto de los agrios más cultivados en España. (**Quantitative analysis of the essences of the citrus fruits most cultivated in Spain**).
Bol. Inst. Invest. Agron. Madr. 1943 : No. 9 : 161–91.
Varietal differences are reported in the essential oil content of the skin in oranges, lemons and mandarins. The orange varieties with the highest essential oil content were Cadenera and Común.
The oil content varied also with size of fruit and degree of maturity.

NUTS 634.5

630. KALAŠNIKOV, V. M. 634.5:582:575.22
(Nut-bearing species of the Far East).
Plodovo-Jagodnye Kul'tury (Fruit Crops) 1940 : No. 5 : 60–68.
The botanical characteristics are described of three species of nut found growing in the Far East. The species are *Juglans mandshurica*, *Corylus heterophylla* and *Corylus mandshurica*. Special attention is given to the variability displayed by each of these species, notably, by the

nuts of *Juglans*, and by the leaves and outer covering of the nut of the *Corylus*. Several sub-species of each have been identified. It is believed that all three species may prove useful to the plant breeder. I. Z.

631. Clapper, R. B. 634.53–2.421.9–1.521.6:575.125:575.127.2
New chestnuts for our forests?
Amer. Forests 1943 : **49** : 331–33, 365.

The chestnut breeding programme in the U.S.A. is outlined. In order to produce blight resistant forms, the American chestnut (*Castanea dentata*) has been hybridized with *C. mollisima* and *C. crenata*. The crosses display considerable hybrid vigour and possess the growth form of *C. dentata*; their degree of disease resistance is, however, intermediate between that of the parents and it is necessary therefore to back-cross the F_1 types to the Asiatic species. No heterosis occurs in the cross *C. mollisima* x *C. crenata*, either in vigour or in disease resistance. Other species used in the timber breeding programme include *C. ozarkensis*, *C. floridana*, *C. floridana margaretta*, *C. alabamensis* and *C. Ashei*.

A scheme for breeding disease resistant nut forms is also under way, the principal species concerned being *C. Seguinii*, *C. alnifolia* and *C. paucispina*.

OTHER FRUITS 634.6

632. Burret, M. 634.6(53)
Die Palmen Arabiens. (**The palms of Arabia**).
Bot. Jb. 1943 : **73** : 175–90.

The known genera and species of Arabian palms are described including a new genus, *Wissmannia*, in which is placed *W. carinensis* (Chiov) Burret nov. comb. (= *Hyphaene carinensis* Chiov).

The genus *Nannorhops*, previously unknown in Arabia, is represented by a new species *N. arabica* Burret nov. spec. and the presence in Arabia of the genus *Phoenix* is confirmed.

R. M. I.

633. Camp, W. H. 634.73:582(73)
A survey of the American species of *Vaccinium* subgenus *Euvaccinium*.
Brittonia 1942 : **4** : 205–47.

A valuable and detailed account of North American members of the subgenus *Euvaccinium* is presented. Taxonomic and nomenclatural questions are discussed and the conclusions established in the light of morphological, phylogenetic and cytological considerations.

634. Camp, W. H. 634.73:582:576.12:576.356.5:575.12
On the structure of populations in the genus *Vaccinium*.
Brittonia 1942 : **4** : 189–204.

The tribe Vaccinieae contains 33 genera including *Vaccinium* but the intrageneric distinctions in the latter group are sometimes more significant than the intergeneric.

Evolutionary trends have been elucidated within *Vaccinium*, the following sequences being tentatively suggested: a condensation of flowering branches into racemose bracteolate inflorescences followed by subsequent reduction, eventually to a single flower; anthers with paired awns evolving to unawned anthers; glandular pubescence to glabrousness; and, in the tropics, a tendency for a production of large flowers and specialized fruits.

It is believed that arctic and temperate species have arisen from tropical types and that many distinct tropical species have contributed to the present temperate complex. There are no fundamental sterility barriers between homoploid members of the same subgenus. This fact, combined with the frequent incidence of self-sterility has resulted in the formation of hybrid swarms. Autopolyploidy and allopolyploidy are frequent.

The maintenance of specific distinctions does not depend on the establishment of sterility barriers but on the discontinuous geographical distribution of the types, itself dependent on the specialized ecology and complex geological history of the group. It is believed that certain stocks were differentiated as early as in the Cretaceous.

Phyletic divergence and speciation are sharply contrasted. The former process is believed to occur only in the diploids and to be very slow. Speciation is frequent in the polyploids which are believed to represent "blind alley" processes in the evolutionary sequence.

In the concluding sections, the taxonomy, distribution and probable phylogeny of the basic diploid types is described. Examples are also given of tetraploid and hexaploid speciation and of the formation of hybrid swarms.

635. SCHIEMANN, E. 634.75:575.127.2:576.356.5
Artkreuzungen bei *Fragaria* III. (**Species crosses in *Fragaria* III**).
Flora, Jena 1943 : **37** : 166–92.

Crosses between *F. vesca* ♀ x *F. moschata* ♂ and the reciprocal made in 1937 produced, in the direct cross 6 hybrid plants, 5 pentaploids and one tetraploid and in the reciprocal, 9 plants none of which survived the winter.

Three of the pentaploids, two sterile and one partly fertile, from a Strasburg strain of *vesca* with a Jena strain of *moschata* must have originated from an unreduced *vesca* gamete ($2n = 14$) and a reduced *moschata* gamete ($2n = 21$). Morphological *vesca* characters were dominant and they are described in detail. The two other pentaploids resembled the *moschata* parent and were very like the *elaticollinae* hybrids described previously by Lilienfeld. The tetraploid was pollen fertile and had 28 chromosomes representing one reduced *vesca* gamete and one reduced *moschata* gamete. In spite of this it resembles *vesca* nearly as much as do the first three pentaploids described.

Isolation of the partially fertile pentaploid No. 1535 produced a large and varied progeny which are described in detail.

As is shown in the discussion the cytology of the male tetraploid confirms the homology assumed by Lilienfeld of the 3 genomes of *moschata* among themselves and with the genome of *vesca*; Lilienfeld regards *F. moschata* as an autopolyploid of *vesca* genomes. R. M. I.

636. BURKHART, L. 634.75:581.6:578.08
Firmness of strawberries as measured by a penetrometer.
Plant Physiol. 1943 : **18** : 693–98.

A "strawberry penetrometer" is described which can be used for the quantitative measurement of fruit firmness. Varietal differences in this respect are reported, although it is pointed out that the wide intravarietal variation necessitates an adequate sampling technique.

VITICULTURE 634.8

637. RODRIGUES, A. 634.835:581.45:575.12:578.088
Sôbre o recorte e assimetria da fôlha da videira. (**The outline and asymmetry of the vine leaf**).
Agron. Lusitana 1942 : **4** : 137–53.

A further variety has been studied by the method already described (cf. "Plant Breeding Abstracts", Vol. XIII, Abst. 1380). Rip. x Rup. 3309 has a significantly lower number of teeth than Rip. x Rup. 3306 and 101–14. In assessing these varietal differences the three areas of the leaf marked by the main veins must be considered separately.

638. 634.835–2.111–1.521.6:575(43)
Aussichten der Züchtung frostresistenter Rebenformen. (**Prospects of breeding frost resistant vine forms**).
Forschungsdienst 1943 : **15** : p. 288.

It is claimed that experiments at the Kaiser-Wilhelm Institute for Research on Vine Breeding have been successful in solving the problem of producing frost resistant vines, and as this feature can be combined with other important viticultural characters, the creation of the ideal types of cultivated vines should be within reach.

639. BÖRNER, C. 634.835–2.7–1.521.6:575.11
Die ersten reblausimmunen Rebenkreuzungen. (**The first phylloxera-immune vine hybrids**).
Angew. Bot. 1943 : **25** : 126–43.

The stock, found in 1934 by the author and Schilder to be immune to all known biotypes of phylloxera, was a strain of *Vitis cinerea* from the Arnold Arboretum, Mass., U.S.A. and referred to in this paper as *"Cinerea Arnold"*. Besides immunity to the leaf phylloxera, the strain is also immune to the root phylloxera.

Crosses were made between *Cinerea Arnold* and varieties of *V. vinifera*, *V. vulpina* (*riparia*),

and hybrids from the crosses *V. vinifera* x *V. vulpina*, *V. vulpina* x *V. rupestris*, *V. solonis* x *V. vulpina*, *V. Berlandieri* x *V. vulpina* and other varieties and hybrids.
An analysis of the factors involved in breeding for immunity to phylloxera shows that besides the dominant factors (*E*), and the multiple resistance factors (*M*) there is an inhibiting factor (*H*) and the number of these factors present varies with the cross.
The strain *Cinerea Arnold* must be assumed to possess at least 13 dominant E factors and 1 MM factor pair.
It is shown that to recover in the F_2 the immunity of *Cinerea Arnold* to the biotype 943 of leaf and root phylloxera, the other parent must have either the factor pair MM_{943} or the factor E_{943} or both factors, and it is therefore anticipated that among the selections made from the F_2 there will be vines completely immune to phylloxera.
These experiments indicate that it should be possible to combine immunity to phylloxera with the valuable viticultural characters of the scion varieties. R. M. I.

FORESTRY 634.9

640. 634.97:575(48.5)
Växtförädling och rationell skogsdrift. Ur ett föredrag av professor Nils Sylvén. (**Plant breeding and rational forest management—from a lecture by Professor Nils Sylvén**).
Skogen 1942 : **29** : 347–49.
The speaker stressed the role of forest tree breeding in the future development of Swedish forestry and its economic exploitation. The two main aims, increased yields and better quality, will involve the production of not only rapid growing trees with shorter rotation periods, but also trees as resistant as possible to diseases and other injurious influences, and trees yielding superior timber.
In practical forest management (including regeneration) and also in forest tree breeding, direct selection and progeny tests should be adopted.
The importance of distinguishing between environmental modifications and genetic characters (such as vigour, branching habit, certain important chemical properties of the timber and disease resistance) is mentioned and cases of variation in such features are exemplified from studies of individual trees in the Scania spruce woods and observations on birches at Ekebo and elsewhere. Mention is also made of the surveys of Swedish woods to study *inter alia* variation in different forest trees; the function of the breeder in utilizing valuable forms thrown up by natural selection; and the application in Sweden of controlled pollination and breeding to various soft and hard wood species and the birch in particular.
Selection by elimination should be avoided.

641. Jensen, H. 634.97:575(48.5)
Plantagemässig produktion av högvärdigt skogsfrö. (**Plantation production of high grade forest seed**).
Skogen 1943 : **30** : 53–56.
Proposals are made to meet the urgent demand in Sweden for an increase in the future output of high quality timber. Full details are given of (1) the method of establishing and maintaining regional plantations for the production of high grade seed from élite trees of superior genotype in the different climatic areas of the country; and (2) the author's preliminary work in establishing model seed plantations for pine and spruce in Sweden and his preparations for a similar programme for other important trees.
The need for wide co-operation by the state and other forest owners, for scientific and technical control and for an advisory organization is stressed.

642. Petterson, H. 634.97:575.1:633
Växtförädlingen och skogsbruket. (**Plant breeding and forestry**).
Skogen 1943 : **30** : 31–37.
This critical article on the relation between breeding and sylviculture is a reply to Nils Sylvén's article on "Plant breeding and rational forest management" (cf. Abst. 640) and Nilsson-Ehle's lecture on increased production in Swedish forestry, reviewed in the Swedish daily press in December, 1942.
The author discusses in detail the attitude of the forester to the work of thinning and the

selection of trees for seed, which must be based on individual selection by experienced staff, with due allowance for the reaction between the phenotype and its environment.
Selection should, according to the author, be regarded as breeding only in so far as it is based on progeny tests that have been actually carried out and, in view of the long term programmes and wide scale of operations necessary in practical forestry, only successful progeny tests may be taken as a basis for practical measures in forestry, in contradistinction to plant breeding in which even doubtful indications may be turned to advantage.
Nilsson-Ehle's suggestion that plant breeding methods on the basis of selection should be applied to forest trees is countered by the question as to whether the advance obtainable by such means is likely to equal the improvement in quantity and quality that can be obtained by good forest management.
The writer holds that plant breeding in agriculture and in forestry are not comparable and he demonstrates by a hypothetical example that, under conditions of self-sowing from seed trees, selection by progeny testing is scarcely likely to achieve any greater advance in output than by the forester's method of visual inspection.
The dependence of the quality of the site upon the locality and the genotype and also the production capacity of the stand are discussed at length.
The problems that arise when seed collection is confined only to élite trees in chosen stands are examined.
According to the author's definition the preceding methods of improvement pertain to sylviculture and the function of the breeder in selection work should be confined to progeny tests carried out for purposes of study and to small scale breeding for improved types. Under certain conditions however breeding based on selection may find a direct application in forest management, e.g. the vegetative multiplication of élites in seedling plantations.
In conclusion the author undertakes a statistical refutation of Nilsson-Ehle's assertion that the yield per hectare in Swedish forest lands could be increased in a relatively short space of time and that breeding applied to forest trees in nature can effect even greater improvements than with crops that have already undergone selection during centuries of cultivation. Finally he strongly opposes Nilsson-Ehle's view that the role of sylviculture is subordinate to that of the breeder.

643. 634.97:575.42(48.5)
634.97–1.531.12(48.5)

Inventering av elitstammar. (**Survey of élite trees**).
Skogen **1943** : **30** : p. 74.

The Swedish Department for Crown lands has issued to all forest officials the directions here cited, in preparation for a survey of élite hard and soft wood trees in Sweden.
Élites presumably possess a superior genotype though their value must be verified by progeny tests in each case.
Élite trees are defined and directions given for their discovery and identification, and registration, as well as for their evaluation by progeny tests by forest officers.
Among the aims of the survey are: the establishment of selected stands to act as a live store of superior seed and young plants, the promotion of forest tree breeding by the provision for that purpose of superior material from the crown forests, and the protection of potentially valuable genotypes as sources of superior seed.

644. Jensen, H. 634.97–1.531.12:575:578.08(48.5)

Nya vägar för produktion av högklassigt skogsträdsfrö. (**New ways for producing high grade seed of forest trees**).
Skogen **1942** : **29** : 73–77.

Stressing the importance of high grade seed from selected trees after progeny testing for future forest plantations, breeding and timber production, the author describes how, in his opinion, seed production from such élite trees can be achieved most rapidly and effectively. Production from seed or from clones is compared and the role which controlled pollination may play is indicated. Some minor disadvantages in Syrach-Larsen's method, applied to spruce and pine under Swedish conditions, are indicated as well as the great advantage of inducing artificially the production from sexual or vegetative progeny of élites, "dwarfed" trees that mature early and produce an abundant and regular set of seed and from which the seed can be easily gathered from the ground. On analogy with the technique used to induce early and abundant

fertility in fruit trees, the writer suggests that the method of strangulation, in some cases, with ringing, might be used for forest trees. Both of these processes are discussed, with a report on the author's own experiments on strangulation applied to fruit trees and numerous forest trees. His work on grafting on so-called "dwarf" stocks, a method particularly useful with those tree species that do not readily respond to strangulation, is also considered with a special reference to grafts of aspen on the highly vigorous *Populus trichocarpa*. The importance of photoperiodism in grafts of these and other forest trees is also pointed out with a suggestion as to how this factor could be utilized to promote better seed production in tree forms from the extreme north, when grafted on short-day stocks and grown under more favourable climatic conditions than their natural habitat.
The problem of the most suitable dwarf stocks for Swedish forest trees in mentioned, and also the question of the most suitable species to use.

645. CURRY, J. R. 634.975:575(73)
Selection, propagation, and breeding of high-yielding Southern Pines for naval stores production.
J. For. 1943 : **41** : 686–87.

Slash Pine (*Pinus caribaea*) trees giving a consistently high yield of gum have been selected for study. A start has been made in crossing trees of high-yielding capacity, using the technique that has proved successful in the development of high-yielding strains of *Hevea*.
The rooting of cuttings from trees 15 years of age and older has so far been successful only after complex chemical treatments, and in most cases rooted cuttings have died as a result of fungus attack. J. W. B. S.

646. LINDQUIST, B. and RUNQUIST, E. 634.975:575.061.1:576.16(48.5)
Krontypsvariationen hos den smalkroniga tallen i Norrland. (**The variation in crown type in the narrow crowned pine in Norrland.**)
Skogen 1943 : **30** : 69–72.

The northern Swedish pine, which is narrow crowned, and the southern Swedish, which is broad crowned, have long been regarded as distinct types based essentially on genotypic differences, but the detailed study of variation in the Swedish pine population is not yet complete. The authors here make their contribution to the subject by outlining the four large geographical groups of pine in Norrland and describing various well known variants of the narrow crowned pine with notes on their possible origins, incidence and economic value.
In one group a type is sometimes found with broad crown combined with narrow top; it is attributed to bud mutation.
The various types of narrow crown, classified by the angle of the branches to the trunk, their position and size and the crown profile, etc., are shown by illustrations and photographs. One of the conical pointed narrow forms of crown (spetssmalkrone) is regarded as of possible value for breeding work, though of minor importance in practical forestry. The "worm pine", (ormtallen), with its defective system of branches of the second order, possibly due to a loss mutation, ranks mainly as a curiosity.
The fact that the same type occurs in different climatic regions and on sites of very different qualities suggests that all these types are probably genetically distinct and are based fundamentally on the numerous possible genetic combinations affecting the formation of crown and branches in the pine. This variation could be exploited in breeding the Norrland pine.

647. DEGELIUS, G. 634.975:575.061.633
Tall med försenad klorofyllbildning. (**Pine with retarded chlorophyll formation**).
Skogen 1943 : **30** : p. 79.

This is a note on a young specimen of *Pinus sylvestris* L. f. *variegata* Carr. half a metre high, fresh and well developed, found in Västmanland; all the needles of its annual shoots were yellowish white owing to lack of chlorophyll. The fact that it stood near two normal pines the same size as the "albino" form is interpreted as indicating that the latter is genetically conditioned and not due to environmental factors. At a second inspection the tips of the needles had assumed a greenish colour.
Relevant literature on this rare form which occurs in both northern and southern Swedish pines is mentioned. A similar form of spruce is not quite so rare.

648. Petrini, S. 634.975:576.16
De internationella tallproviensförsöken av år 1907. (**The international provenance experiments with pine of the year 1907**).
Medd. Skogsförsöksanst. Stockh. 1942 : **33** : 247–66.
The first international provenance experiments with scots pine (*Pinus sylvestris*) were started in 1907. The series included twelve different provenances: Scotland, France, East Prussia, Belgium, Bavaria, Kurland, Brandenburg, Russia (Ural), Bulgaria, North Hungary, West Hungary, and Sweden (Lapland). The series was planted at 18 different places and at least two-thirds of the plots have since been destroyed. The Swedish plot is located at lat. 57° 38′ N., long. 15° 37′ E. The soil is ordinary moraine. In this locality the Kurland (Riga) Pine has given the best results both as regards volume production and timber quality (straightness, size of branches and knots). Next comes the Scottish provenance (Inverness, 57° 14′ N., 3° 42′ W.). The Swedish Pine from the northernmost part of the country, here growing in southern Sweden, is in the fourth place after the East Prussian provenance. Of the remainder, the pines from Bulgaria and Russia (Ural) are of excellent quality though their volume production is less than average.

649. Riker, A. J.,
Kouba, T. F.,
Brener, W. H. and
Byam, L. E. 634.975–2.452–1.521.6:575.42
White pine selections tested for resistance to blister rust.
J. For. 1943 : **41** : 753–60.
For the purpose of studying the resistance of native Wisconsin white pine (*Pinus strobus*) to blister rust (*Cronartium ribicola*), selections were made of young cone-bearing trees that showed no blister rust cankers after years of close association with *Ribes* bushes. From these trees, open-pollinated seed was collected as well as twigs, which were grafted on ordinary white pine 2 + 2 transplants.
An experimental nursery was prepared for testing the resistance to blister rust of the selected trees and their seedling progeny. Included in the tests were 1000 grafts and 10,000 seedlings of selected stock, some seedlings of commercial stock, as well as 600 *Ribes* bushes (*R. missouriense*, *R. Cynosbati* and *R. nigrum*), so placed that each pine tree was 3–8 ft. from a *Ribes* bush. Two replicate plantings received natural inoculation only, while two others had natural inoculation supplemented with artificial inoculation.
Results from replicated plantings showed that, after both natural and artificial inoculation, a high percentage of seedlings had stem cankers within a year (56 and 64 per cent. from *Ribes Cynosbati* and 85 and 91 per cent. from R. *nigrum*) whereas only a small percentage of grafts showed stem cankers (5 per cent. from *R. Cynosbati* and 4% from *R. nigrum*).
Experience in the vegetative propagation of white pine, both by grafting and by rooted cuttings, indicates its possible value and the need for improvement in selection of material and the making and treating of cuttings. J. B. W. S.

VEGETABLES 635

650. Barrons, K. C. 635:575.12
What's cookin' in hybrid vegetables.
Sth. Seedsman 1943 : **6** : No. 12 : 14, 42, 54.
The prospects of introducing F_1 hybrid types are considered for the following crops: vines, squashes, cucumbers, musk-melons, tomatoes, egg-plants and asparagus. It is pointed out that not all crosses are heterotic and that the difficulties of crossing certain species may make hybrid production uneconomical. Breeders are advised, however, to consider the possibilites that this technique presents.

651. Frimmel, F. v. 635:575.125
Die Heterosis-Frage im Gemüsebau. (**The heterosis question in vegetable growing**).
Obst- u. Gemüseb. 1942 : **88** : 24–25.
[From Forschungsdienst 1943 : **15** : (p. 69)].
Heterosis and the advantages obtainable by its use in breeding are described, with special

reference to vegetable breeding. Spinach is particularly suitable for such treatment and tomatoes, paprika and egg plant also give good results. The author is at present testing the suitability of the technique for cucumbers, melons and marrows. Lettuce and cabbage are not good material for the process. Promising results can be expected when the plant is clonally reproduced, e.g. asparagus and rhubarb.

652. TUCKER, C. M. 635–2–1.521.6
Controlling plant diseases in the home garden.
Circ. Mo. Agric. Exp. Sta. 1942 : No. 238 : Pp. 8.
This circular includes a list of disease resistant vegetable varieties.

653. KRICKL, M. 635.25:581.142:575.42:576.341
Spätaustreiben—relativ geringer Gewichtsverlust—hoher osmotischer Wert. **(Late sprouting—relatively slight loss in weight—high osmotic pressure).**
Gartenbauwiss. 1942 : **17** : 51–90.
This paper presents the detailed results of experiments made to determine the factors influencing onion sprouting under storage conditions. A correlation has been established between late sprouting, on the one hand, and small loss in weight during storage, and high osmotic pressure, on the other. It is suggested therefore that these two properties may be of use in selecting material that will keep well under storage conditions.
Sprouting time is partly determined by genetical factors and the progeny of the various types investigated exhibited a wide range in behaviour, very early and very late sprouting forms being produced. Three main classes of onion are recognized: (i) an early sprouting group of little commercial value, (ii) a large group sprouting rather later than the first group and including both valuable and inferior types and (iii) a very late sprouting class which contains high quality types but sprouts too late for immediate utilization in seed production for the following year.
A correlation was also found between high osmotic pressure and firmness and considerable variation detected in the value of osmotic pressure in different scales of the same bulb. It is recommended that only individuals with a high osmotic pressure in all the scales should be selected.
The influence of environmental factors on these qualities is mentioned and also the varietal differences in resistance to low temperature and mildew.
In the final sections of the paper, the importance of the bulb morphology is indicated. The outer scales are distinguished from the inner "heart" scales and a correlation is stated to exist between late sprouting and a high proportion of "heart" tissue. There may be one or more shoots in any bulb and the components of a compound bulb may sprout at various times. A complex relation is found between these features and both environmental factors and the genotype. Bulbs with a single shoot should be selected.

654. 635.34:576.312.35
MENEZES, O. B. de 635.52:576.312.35
Número de cromossômios em *Brassica* e *Lactuca*. **(Chromosome number in *Brassica* and *Lactuca*).**
Rev. Agric., Piracicaba 1943 : **18** : 277–78.
Pollen mother cell observations in the Portuguese kale (couve tronchuda, referred to as *B. oleracea* L. var. *sabauda*) and in *L. sativa* L. var. *romana* showed that $n = 9$.

655. NEWCOMER, E. H. 635.34:581.04:576.356.5:577.16
An F_2 colchicine-induced tetraploid cabbage and some comparisons with its diploid progenitor.
J. Elisha Mitchell Sci. Soc. 1943 : **59** : 69–72.
Tetraploid cabbages have been obtained by the colchicine technique; they were larger than the diploids in all respects except chloroplast dimensions. Multivalents, principally quadrivalents, were frequent at meiosis and disjunction was normal, up to 70% fertility being recorded. The lower leaves of the tetraploids contain just over four times as much vitamin C as the diploids.

656. Himič, R. E. 635.35:575(47)
(Cauliflower breeding).
Vestnik Ovoščevodstvo i Kartofel' (Vegetable and Potato Journal) 1941 : No. 2 : 48–50.

Cauliflower breeding was started at the Gribovo Station in 1932. An examination of 14 strains showed the best to be selection No. 1355 of the Haag cauliflower, which flowered well when grown in the open. Further selections were made for early ripening and type of head. Selection was carried out on unbagged plants, since all attempts to apply inbreeding or close breeding resulted in failure. The selections all produced good heads by 23rd June, whereas only 23% of the unselected stock formed marketable heads. The seed yield was also much higher in the selections. The new variety has been named Rannjaja Gribovskaja [Gribovo Early].

657. 635.5:581.162.31
635.6:581.162.31
Arróniz Sala, C. 633.842:581.162.31
Manera de realizarse la fecundación de las flores de algunas plantas hortícolas autógamas. (**Mode of fertilization in the flowers of certain self-pollinated horticultural plants**).
Bol. Inst. Invest. Agron. Madr. 1943 : No. 9 : 129–47.

Observations were made on the floral biology of a number of horticultural plants and of their behaviour when a single flower on a single plant was spatially isolated. Fruit was set in all five varieties of sweet pepper (*Capsicum annuum* L.) examined; the average amount of sterility, calculated as the proportion of flowers that failed to set seed, was 4·63%. In the tomato variety Aranjuez the average sterility was 9·36%, in the egg plant variety Larga Violeta [Long Violet] 4·35%, and in 2 varieties of lettuce 2·27% and 2·30 respectively.
Fertilization occurs very rapidly in lettuce and the chances of out-pollination are thought to be small; in all the other species the chances are fairly high if the plants are grown in the vicinity of others, since the flowers are frequently visited by insects.

658. 635.52:575
635.63:575
Woolford, B. C. 635.652:575
The five big winners . . . . of the 1944 awards.
Sth. Seedsman 1943 : **6** : No. 10 : 12–13, 45, 49.

The following three new varieties are described. Great Lakes is a lettuce which combines good quality and heat resistance. Cucumber 1821 is a cylindrical cucumber suitable for transport; it has firm white flesh and an attractive appearance. Keystonian is a stringless bush bean with green pods and is distinguished by high yields and good canning quality.

659. Griffiths, A. E. 635.611:576.16(79.1)
With cantaloupes, "13" is a lucky number.
Sth. Seedsman 1943 : **6** : No. 11 : 13, 37, 44.

Arizona 13 is a new cantaloupe variety derived from Imperial 45 x AZ. It is characterized by its vegetative vigour, early maturation, smallish fruits and good flavour.

660. Schnack, B. and
Cavia, C. E. 635.62:577.8:575.11
Un tipo sexual anormal en *Cucurbita Pepo*. (**An abnormal sex type in *C. Pepo***).
An. Inst. Fitotec. Santa Catalina 1941 (1943) : **3** : 21–28.

The various sex types known in the Cucurbitaceae are described. In 1941 the author found a plant of *C. Pepo* which bore normal male and female flowers and also flowers referred to as androhermaphrodite, i.e. having the appearance of male flowers but possessing both pistil and stamens; the plants themselves are referred to as androtrimonoecious. Selfing one of these plants produced 103 androtrimonoecious plants and 55 normal. Further selfing and crossing experiments are in progress.

661. COULTER, F. C. 635.64:575(73)
Tomato—the universal favorite was long under suspicion.
Seed World 1943 : **54** : No. 6 : 10–11, 38.

A historical survey of the tomato is given from the time when it was first discovered in Peru up to the present day. Its spread into all parts of the world is outlined, together with a summary of its breeding history. The most promising recent varieties bred in America are: Pan American, a very productive type that is highly resistant to fusarium wilt; Victor; Jubilee, an improved yellow globe type; and Scarlet Dawn, an early variety.

662. LESLEY, M. M. and
LESLEY, J. W. 635.64:575.127.2:575.113:576.356.5:575.242
Hybrids of the Chilean tomato. Sterile and fertile plants of *Lycopersicon peruvianum* var. *dentatum* Dun. (*L. chilense* Dun.) and diploid and tetraploid hybrids with cultivated tomatoes.
J. Hered. 1943 : **34** : 199–205.

Three clones of *L. peruvianum* var. *dentatum* are described. They all behave aberrantly at meiosis, exhibiting effects comparable to those determined by the sticky-chromosome gene of maize. Since all three families were derived from a seed from a thirteen-year old herbarium specimen, it is suggested that abnormal storage conditions may have increased the mutation rate in the seed concerned.

Hybrids were made between one of these clones and both *L. esculentum* and *L. esculentum* x *L. pimpinellifolium*. The F_1 progeny were extremely vigorous but partially sterile. Stem and leaf canescence, *dentatum* leaf shape, presence of pseudostipules and bracts, and fruit pubescence were inherited as partially dominant characters from *L. peruvianum*. The skin of the F_1 hybrids was pale yellow, indicating that *L. peruvianum* contains some factor other than the *Yy* gene pair which affects skin pigmentation. Very little lycopene was found in the hybrid, presumably because a gene either allelic and dominant to *R* or eustatic to *R* is present in var. *dentatum*.

Allopolyploids were obtained from both of the above crosses. Meiosis in these plants bore close resemblance to that in autopolyploids of *L. esculentum*. It is suggested in the light of this finding that *L. peruvianum* var. *dentatum* has a much closer genetic affinity to the *Eulycopersicon* species than the phenotype would suggest.

A triploid family, derived from open-pollination of an F_2 generation of *L. esculentum* x *L. peruvianum* var. *dentatum*, is described. It may have arisen from a tetraploid plant pollinated by var. *dentatum*.

663. SOKOLOVA, A. M. 635.64:576.356.5
(Tetraploid tomatoes).
Vestnik Ovoščevodstvo i Kartofel' (Vegetable and Potato Journal) 1941 : No. 2 : 39–47.

Tetraploids were obtained by the decapitation method from a number of tomato varieties and from various F_1 hybrids. All were below the respective diploids in yield, especially in cool seasons, when the tetraploids sometimes failed to give a crop at all. An exception was provided by *L. pimpinellifolium*, whose tetraploid yielded nearly three times as much fruit as the diploid.

The tetraploid fruits of the variety Pervaja Žatva (First Crop) were similar in shape to those of the diploid only smaller. The tetraploids from the hybrids Sparks x Humbert and Bison x Buka were intermediate between the respective parents, like the F_1, but the progeny did not segregate. The number of seeds per fruit never exceeded 60 in the tetraploids, whereas the diploids had up to 180. The tetraploids were later in flower and fruit ripening and the fruits were less abundant. The tetraploid fruits however kept much better in storage and were still sound in the middle of December; some kept even into January. This is ascribed to their higher dry matter content and coarser skins, which crack less than those of the diploids. The tetraploids also had a higher sugar content; the vitamin C content was greater in some and less in others.

Attempts to cross the tetraploid forms of Humbert and First Crop with their respective diploids mostly failed, only three fruits being obtained from several hundred crosses, and these proved to be parthenocarpic, being devoid of seeds. Pollination of 335 flowers of tetraploid tomatoes

with Mexican Physalis produced 18 fruits, and 154 pollinations of the reciprocal produced 48 fruits. In the following year 200 direct pollinations and 100 reciprocals each produced about 20 fruits. The seeds produced from all these crosses however gave rise to plants of the maternal type and were evidently the result of selfing.

664. Robbins, W. J. and
Kavanagh, V. 635.64:576.356.5:581.143:581.43
Growth of excised roots of polyploid tomatoes.
Amer. J. Bot. 1943 : **30** : 602–05.

The growth rate of excised tomato roots from a polyploid homozygous series was investigated. Haploid roots showed the most pronounced apical dominance and the shortest root hairs, the tetraploids the reverse. The dry weights per mg. of root of haploid and diploid forms were approximately equal but the tetraploids made only a third to a half as much.

665. Lincoln, R. E.,
Zscheile, F. P.,
Porter, J. W.,
Kohler, G. W. and
Caldwell, R. M. 635.64:577.16:575.12
Provitamin A and vitamin C in the genus *Lycopersicon*.
Bot. Gaz. 1943 : **105** : 113–15.

The following types have been analysed for β-carotene, lycopene and vitamin C contents: *L. esculentum*, *L. pimpinellifolium*, *L. peruvianum* and (*L. esculentum* x *L. hirsutum*) x *L. esculentum*. Certain of the lines investigated have contained thirteen times as much β-carotene and three times as much vitamin C as the average value for commercial varieties. These strains may prove valuable as sources of breeding material.

666. 635.64:581.6:575(74.8)
Orange-colored . . . no stem—yet it's a tomato: "Pennorange".
Sth. Seedsman 1943 : **6** : No. 12 : p. 18.

A "stemless" orange-fruited tomato, Pennorange, has been raised. One of its good characters is the rarity with which the calyx becomes detached during fruit picking.

667. Senn, H. A. 635.65:576.312.35:582
The relation of anatomy and cytology to the classification of the Leguminosae.
Chronica Botanica 1943 : **7** : 306–08.

The taxonomic, anatomical, and cytological data relating to the classification of the Leguminosae are reviewed shortly.

668. McFarlane, J. S. and 635.65–2.7–1.521.6
Rieman, G. H. 635.653–2.7–1.521.6
Leafhopper resistance among the bean varieties.
J. Econ. Ent. 1943 : **36** : p. 639.

Details of varietal resistance to potato leaf-hopper possessed by lima beans and snap beans are presented.

669. Walker, J. C. and 635.65–2.8–1.521.6:575.11
Jolivette, J. P. 635.65–1.557:575.061.633
Productivity of mosaic-resistant Refugee beans.
Phytopathology 1943 : **33** : 778–88.

Five mosaic resistant varieties, Idaho Refugee, U.S. No. 5 Refugee, Sensation Refugee 1066, Sensation Refugee 1071 and Wisconsin Refugee have been compared with the parent variety Stringless Green Refugee. Most of the desirable qualities of the original form appear to have been transmitted to the mosaic resistant derivatives.

A chlorophyll deficiency, inherited from Corbett Refugee, occurs in Wisconsin Refugee and Idaho Refugee. Its mode of inheritance is briefly discussed and it was found that its expression is repressed by high temperatures. Selection should be able to remove this undesirable character.

670. WADE, B. L. and KANAPAUX, M. S. 635.652:577.16
Ascorbic acid content of strains of snap beans.
J. Agric. Res. 1943 : **66** : 313–24.

Significant differences in the vitamin C content of pods and leaves of snap bean varieties are reported. The effect of various environmental factors on the values obtained are discussed.

671. CUTLER, G. H. and PROBST, A. H. 635.655:575.42
Earlyana—an early soybean for northern Indiana.
Soybean Digest 1943 : **3** : No. 12 : 4, 14.

Earlyana is a new soya bean variety which originated as an individual plant selection from a row of Dunfield; the selected plant was probably a natural hybrid. This new type resembles Dunfield and Richland but grows relatively faster in the early stages of development; it is three inches taller than Richland.

672. MORSE, W. J. 635.655:575.42(73)
Soybean variety registered, I.
J. Amer. Soc. Agron. 1943 : **35** : 834–35.

Boone is a newly registered variety adapted to upland soils of moderate fertility. It is a selection of P.I.54563–3, the latter being a selection from P.I.54563, a variety introduced from Jungchiangko, Manchuria.

673. 635.655:581.04
One plant's poison is another's perfect food.
Sth. Seedsman 1943 : **6** : No. 10 : p. 22.

Soya beans exhibit varietal differences in their tolerance to zinc ions.

674. GIBSON, R. M., LOVVORN, R. L. and SMITH, B. W. 635.655:581.14
Response of soybeans to experimental defoliation.
J. Amer. Soc. Agron. 1943 : **35** : 768–78.

Varietal differences in the reaction of soya beans to artificial defoliation are reported.

675. BROVTSYN, A. N. 635.656:575.243
(Variation in pea varieties and their admixtures).
Vestnik Ovoščevodstvo i Kartofel' (Vegetable and Potato Journal) 1941 : No. 2 : 27–38.

The American Wonder pea was introduced into the U.S.S.R. in 1920 and was subjected to constant selection for yield. Numerous references in the Russian literature are cited which show that the variety was more variable than most other peas, late maturity, albinism and the formation of rounded instead of wrinkled seeds being among the variations most commonly observed. An examination of 153 unselected lines made in 1939 showed the presence of at least three distinct groups differing in date of maturity, growth habit, type of pod, and number, shape and yield of seeds. Only about 30% of the individuals fell into the group that most nearly corresponded to the original type.

Most families bred true to one type or the other but some segregated and produced plants of more than one type; the off-types are therefore thought to be produced genetically, and not by mechanical admixture. Off-types of a similar nature were detected in other varieties too.

For the sake of comparison, 35 different specimens of American Wonder obtained from different places were examined. Morphologically, all but one conformed to the varietal type but differences in time of flowering of up to 17 days were observed. All degrees of earliness known in peas, with the exception of the extreme late type, were found among them. Wide differences were noted also in height, number of pods per plant and number of seeds per pod. Again, differences of a similar nature, though less in degree, were noted between samples of other varieties of different provenance. The older varieties tended to show greater differences than new varieties.

The possible causes for this variability are discussed. Spontaneous hybridization, though it undoubtedly takes place, is not thought to be the full explanation. Even under conditions of the strictest control the appearance of membranous forms in many sugar peas, of small podded forms in certain common varieties and similar hereditary variations are constantly observed. In view of this situation the necessity for a rigorous system of seed control in order to maintain the purity of the varieties is stressed.

676. HARRINGTON, C. D.,
SEARLES, E. M.,
BRINK, R. A. and
EISENHART, C. 635.656–2.7–1.521.6:578.08
Measurement of the resistance of peas to aphids.
J. Agric. Res. 1943 : **67** : 369–87.

A technique for determining the resistance of peas to aphis attack is described. The criterion used is the rate of aphis reproduction which is measured under standardized laboratory conditions. It is hoped that the method proposed will be useful in individual plant selection. Tables recording varietal resistance to aphis are included.

677. POOLE, C. F. and
GRIMBALL, P. C. 635.67:575.12(73)
A heyday for corn-on-the-cobbers.
Sth. Seedsman 1943 : **6** : No. 12 : 11, 50.

Four new sweet corn varieties suitable for the south-eastern U.S.A. have been released. Kiawah and Edisto are tall late-maturing types derived from crossing inbred lines of Cuban Yellow Flint and Mexican June with inbred strains of Oregon Evergreen and Golden Bantam. The selections were inbred for five years before out-crossing. Wappoo is an early variety derived from a cross between an Iowa inbred line of Golden Bantam and Oregon Evergreen while Carowa is another early type derived from open-pollination within the hybrid Iogold.

678. ERWIN, A. T. 635.67:576.16:575.242
Anent the origin of sweet corn. *Zea Mays*, L. var. *rugosa*, Bonaf.
Ia St. Coll. J. Sci. 1942 : **16** : 481–85.

The question of the origin of sweet corn is discussed. After referring to the evidence provided by archaeology and Indian legends, the author deals with genetical work which suggests that sweet corn varieties have arisen both from dent and flint types that have lost their ability to form starch. It is probable that such a change can take place by simple mutation and several instances believed to illustrate this conjecture are described.

No reference to sweet corn has been located in the literature before 1821 and the author concludes that it arose as a field mutation in post-Columbian times and was known to farmers in the New England states early in the nineteenth century.

BOOK REVIEWS

Ogden, C. K. 5:001.4
Basic for science.
Kegan Paul, Trench, Trubner and Co., Ltd., London 1942 : 2s. 6d. Pp. 314.
10 figs. (Psyche Miniatures—General Series No. 95.)

No one who is engaged in keeping abreast with international developments in modern science can fail to realize the present seriousness of the language problem. Now that fundamental research is being actively pursued all over the world, including the Far East, and the results are being published in the native languages of the experimenters, the task of following any particular line of investigation is becoming increasingly difficult.

Any attempt therefore to resolve or even alleviate this state of affairs is to be welcomed as a positive contribution to scientific progress. Basic English is now well-known, at least by name, to most scientific workers and its claims to furnish a satisfactory solution to the modern babel will naturally receive close attention. Up to the present, no generally approved alternative language has been put forward and this book on "Basic for Science" has been written with the intention of illustrating the ready applicability of Basic English to scientific writing.

After a short historical introduction dealing mainly with the defects of the older artificial languages, the author explains the rationale of Basic English and the necessary extensions required to cover scientific terminology. Most of the book consists of examples of semi-popular and scientific papers written in Basic English, in order to illustrate the utility of the method, and the concluding portions include lists of Basic Scientific terms.

The provision made for botanical writers is rather meagre. In the Basic English list of 850 words, the following botanical terms are encountered: apple, orange and potato; stem, root and leaf; and seed and berry. No purely botanical words are found in the General Science list, while in the Biology list, out of 50 words, 30 are biological, 15 zoological, and only 5, viz. bark, sepal, petal, stamen and pollen, are botanical. For other terms, the reader is referred to the list of 2500 International Science words at present in course of publication, 600 of which are listed in an appendix to the book.

The advantages that would accrue from the adoption of Basic English in scientific communications need no emphasis but it is advisable to bear in mind the corresponding draw-backs. The purpose of scientific language is to signify concepts without reference to which words are meaningless. It is generally admitted moreover that words usually fail to convey the total content of an idea and it is a matter of common experience that the full resources of a language must be utilized in an attempt to express concepts as adequately as possible. There is a serious danger that an artificially restricted word list would reverse the essential interrelation of terms and concepts; instead of words symbolizing ideas, concepts would be stultified in the attempt to force them into correspondence with a pre-arranged terminology. Such a reversal of values would be disastrous to clear thinking and it seems preferable therefore to present major scientific communications in one of the principal European languages, using the full resources of vocabulary and syntax, rather than in an artificially restricted albeit easily learnt substitute.

It is also impossible not to be concerned at the possible consequences that Basic English might have on literary standards. The extreme undesirability of the present divorce between science and literature is generally acknowledged and any suggestion that might accentuate the present drift of scientific specialization away from cultural values cannot be readily accepted. The inconveniences caused by the multiplicity of languages are obvious but in seeking a remedy, the danger of losing values out of all proportion to the advantages gained must be considered.

Mr. Ogden's painstaking work in attempting to introduce order into international scientific terminology is a valuable contribution to scientific advancement. His book will enable readers to perceive for themselves both the advantages and disadvantages of Basic English and will help them towards an appreciation of the difficulties involved in this important modern development.

SCHOPFER, W. H. 577.16

Plants and vitamins.

Chronica Botanica Co., Waltham, Mass. 1943 : $4.75 : Pp. xiv + 293. 17 tables. 17 figs. 3 plates.

This translation of Professor Schopfer's book will be of considerable value to those who are concerned with the study of vitamins. After a preliminary account of the classification and definitions of active substances, the author proceeds to a detailed treatment of the chemistry and biology of the vitamins at present recognized. Most of the information relates to heterotrophic micro-organisms but many important principles of general botanical interest emerge. Plant breeders will welcome the information presented on the distribution of the various vitamins, in particular, those most recently identified. There is also a valuable synopsis of the physiology of vitamin formation which includes an account of the many ways in which environmental factors may influence the content of the various vitamins. Other points of special interest are the importance of phytol in vitamin biochemistry and the clear account of the different physical effects which may be confused with vitamin deficiencies.

The main theme of the book is that heterotrophy in general, and vitamin requirement in particular, are resultant states caused by the loss of the capacity to synthesize biologically essential substances. Since heterotrophy is found in many taxonomically distinct classes, its polyphyletic origin appears certain. It is important to note however that, in the majority of cases investigated in the plant kingdom, the substances required in small quantities by the heterotrophes are restricted to a small number of compounds which are practically the same as those recognized to be essential for the higher animals. The loss of synthetic capacity, therefore, appears only to occur in a few biochemical systems.

It is pertinent to ask here whether a plant may become dependant on a growth substance *de novo*, i.e. not as the result of the loss of a synthetic capacity. The requirements of some plants for particular metallic ions may well be a secondary dependence and it is conceivable that such a secondary requirement may extend to organic compounds. Another point which the author stresses is the irreversibility of the loss of synthetic capacity. Since, however, cases are known in which a heterotrophic micro-organism may be "trained" to autotrophy, this concept loses much of its significance, for it is impossible to know whether a particular plant, although normally a heterotrophe, may not possess a hidden capacity for autotrophy, either by mutation or by being placed under appropriate experimental conditions. The author also treats of the relation between genes and the vitamin systems and suggests that the former may act immediately on the enzymes synthesizing vitamins; the data on this theory are meagre however and the subject therefore highly speculative.

In chapter V, the author deals with the difficult question of the classification and definition of active substances and this is probably the least satisfactory portion of the book. A sharp distinction is maintained between "true" vitamins and nutrients, an unnatural division which leads to artificialities when micro-nutrients are considered. If it were acknowledged that the distinction between vitamins and nutrients is merely relative, several of the problems discussed in this book could be eliminated as non-existent.

There are also a number of cases calling for more precise treatment. It seems to be implied on p. 34 that all enzymes have a prosthetic group and that the latter is equivalent to a co-enzyme; furthermore, it is suggested that all vitamins must be utilized as co-enzymes or parts of co-enzymes, yet riboflavin is mentioned as forming part of the "yellow" enzyme. On p. 150, after mentioning that *Bacterium acetylcholini* requires two unidentified factors for normal growth, it is revealed eight lines later, that one of these has been identified as pyridoxine. In the treatment of carotenoids on p. 42, vitamins A_1 and A_2 are mentioned in the paragraph heading but are not differentiated in the following text nor is it clear on p. 45 whether the formula depicted refers to α-tocopherol or β-tocopherol. There is also a contradiction in the statement on the same page that the simplest vitamin K analogue is 2-methyl-3-hydroxy-1 : 4-naphthoquinone which is only slightly active; on p. 46, it is asserted that 2-methyl-1 : 4-naphthoquinone has approximately three times the activity of vitamin K_1.

It is, of course, practically impossible for any one worker to keep abreast of all the scientific literature that bears on his subject, especially such a wide subject as vitamin biochemistry. This probably explains why the author has seen fit to ignore cryptoxanthin in his treatment of vitamin A precursors and to dismiss cursorily the question of combined ascorbic acid. Also, it has never been proved that it is the *Rhizobium* component that fixes nitrogen in the symbiotic system of leguminous root nodules.

Minor points calling for criticism are the use of straight chain formulae for sugars, a few orthographical errors, a rather burdensome repetition of much of the subject matter and the awkward arrangement of the references at the ends of each chapter. These draw-backs do not, however, detract from the usefulness and stimulating reading that this book provides.

WHITE, P. R. 581.14:578.08
A handbook of plant tissue culture.
Jaques Cattell Press, Lancaster, Pa 1943 : Pp. xiii + 277.

The task of a reviewer is always more difficult when he has to deal with a book which treats a subject untouched by other volumes. He is unable to judge by comparison and is forced therefore to make a criticism based on his own *a priori* concept of a good book.

Dr. White's volume is a case in point, for it is the first book to cover the subject of plant tissue cultures, on which matter the author is a leading authority. This fact alone makes the book indispensable for botanists interested in tissue culturing and to all those who are concerned with the theoretical questions on which this technique throws light.

One of the most pleasing features of the book is its clarity of presentation, a virtue which gains from the broad and comprehensive outlook from which the subject is treated. It is tempting to dub this work an experiment in scientific humanism, or perhaps better, humanist science. The author's flair for quotation is fully expressed although it might be suggested that Ockham's razor is becoming blunt from over-use in scientific treatises.

A feature which is less satisfactory is the patchwork interweaving of historical matter, descriptions of technique, accounts of the biological applications of the methods described and short hardly adequate dissertations on the scientific method. Too much detail is included in the descriptions of technique and it is felt that a photograph of the author's record book is redundant.

Geneticists will not be satisfied by the unqualified statement that excised root cultures are necessarily genetically uniform and the preliminary morphogenetic discussion tends to antithesize too sharply the theories of cell totipotency and irreversible segregation of developmental capacity.

The book is well printed, copiously illustrated, and contains a bibliography with over four hundred references.

BLAKE, S. F. and
ATWOOD, A. C. 581.9:582
Geographical guide to floras of the world. Part I.
Misc. Publ. U.S. Dep. Agric. 1942 : No. 401 : Pp. 336. Price 75c.

This book is another example of the valuable bibliographic research which has been sponsored by the United States Department of Agriculture. It is stated in the introduction that usefulness and not bibliographical completeness is the primary purpose of the volume, but this disclaimer in no way detracts from its value. A list of floras and floral lists has been compiled for the continents of Africa, Australia, America and the oceanic islands lying nearest to them. These land masses are sub-divided into convenient regions and the names of the relevant floras, together with details of their contents, presented. A certain degree of editorial selection has been practised, resulting chiefly in the exclusion of old and unreliable publications.

The usefulness of this work is undeniable and it can be recommended to all those interested in the geographical distribution of plant material.

FASSETT, N. C. 582
The leguminous plants of Wisconsin.
University of Wisconsin Press, Madison 1939 : Pp. xii + 157. 59 figs. 24 plates. maps.

This book gives an exhaustive monographic treatment of the family Leguminosae in the state of Wisconsin, U.S.A., chiefly from the taxonomic and ecological aspects. Only the wild species are dealt with.

In the taxonomic portions no new species, varieties or forms are described since the author has already dealt with these elsewhere. With critical or "difficult" genera and species, by studying populations in the field and under experimental conditions as well as from herbarium material, the author preserves a refreshing openness of mind and does not overburden us with a multitudinous array of names based on small and fluctuating characters.

The keys for the identification of the species are excellent, and one feels that, armed with this book, the smallest fragment of a Leguminous plant from Wisconsin could be identified with ease. Not only do we find keys based on vegetative and floral features; there are others for identifying the species from fruits, seeds and epidermal outgrowths; whilst the genera themselves bear keys to the individual species, varieties and forms.

The geographical range of each species is given, and is clearly illustrated by distribution maps; in many cases maps are also given showing the distribution of a species over the whole of the United States, especially when its range only just reaches the borders of Wisconsin. Many of the Wisconsin maps also include the main soil types when a particular species seems to be confined to one or more of these.

Of particular interest are the notes, based on historical records, of the spread or diminution of the various species in relation to changing ecological conditions and to the spread of agriculture.

The plates leave nothing to be desired, since the book is illustrated by copious diagrams and photographs, both of general habit and of the smaller details. An ultimate chapter dealing with the epidermal outgrowths is illustrated by camera lucida drawings of individual hairs and glands.

The few criticisms which must be made are not intended to detract from the work under review which is undoubtedly of very high standard. There is, however, a certain lack of uniformity, as when certain species are given short botanical descriptions whilst others do not receive any. Again, the exact localities of certain species occurring rarely in Wisconsin are given, whilst with others only a vague note on the county is appended. It would probably have been of value to give the localities of all the rarer plants even though the book were sensibly lengthened by so doing.

The glossary is very incomplete and heterogeneous, and could quite well have been left out; thus, it includes words such as "calyx", "corolla", "leaflet", etc., the meaning of which must be known to everyone who has the slightest pretence to botanical knowledge; yet it does not enlighten us as to the meaning of such words as "glabrate", "puberulent", "strigose", "scape", "peltate", "excurrent", "filiform", etc., which the tyro would not be expected to know. Similarly, we are told the meaning of the abbreviations "cm." and "mm." but not of "dm." and "m.".

In its conception and general layout, however, this book is excellent, and it falls short of the ideal to such a slight extent that only minor criticisms can be levelled at it. Indeed, it is to be hoped that it will serve as a model for the similar treatment of other families of flowering plants not only in Wisconsin but in the other states of the U.S.A. J. G. H.

SMART, J. (Editor) 582(41)

Bibliography of key works for the identification of the British fauna and flora.

Linnean Society, Burlington House, London, W.1 and Adlard and Son Ltd., Bartholomew Press, Dorking, Surrey, 1942 : 7s. 6d. Pp. viii + 105.

This handbook contains a useful list of references relating to the identification of British fauna and flora. Only the last eighteen pages deal with botanical works and these, although of little use to a specialist, will be of assistance to any one wishing to locate key works dealing with the British flora.

The appalling dearth of up-to-date taxonomic literature is very evident from this manual. There is no work in English dealing with the British species of most groups of fresh-water algae, nor has any comprehensive work on the Ascomycetes or Hyphomycetes been published in this country since Cooke's "Handbook" in 1871 and Massee's "British Fungus Flora" in 1892–95. A British flora of higher plants is in course of preparation but for the present, only revised editions of out-of-date manuals are available.

Short descriptions of the works cited are included and these could, with advantage, have been more critical. It is likely, however, that this bibliography will remain a standard source of reference for some time to come.

BROWNE, C. A. 63:007

Thomas Jefferson and the scientific trends of his time.

Chronica Botanica Co., Waltham, Mass., 1943 : Pp. 63. illus. maps.

The realization that an adequate history of science or of any of its major branches has not yet

been written has become a commonplace in recent years. Capable scientists and painstaking historians have been plentiful but a combination of the two types of scholarship is as rare as it is necessary. Yet in the dearth of any really comprehensive treatment of the history of science, it is possible to glean some comfort from the several books on limited aspects of the subject which have appeared lately. Monographic research is a necessary preliminary for more comprehensive studies and such investigations merit a careful appreciation.

Thomas Jefferson played an important role in the organization of science in America and this short account of his scientific interests provides an interesting picture of his attitude to the developments of the time. The author has confined his attention to the topics then classed under natural history. Jefferson was a benefactor to science rather than an original scientist but the wide range of his interests justifies the high place which he holds among the distinguished dilettanti of the late eighteenth century. The author describes in some detail Jefferson's contributions to agriculture and his promotion of scientific research and education. His utilitarian bent is evident from his letters, also his cautious distrust of hypothesizing. We are told that "it is always better to have no ideas, than false ones; to believe nothing, than to believe what is wrong".

This last sentiment is treated unsympathetically by the author, who appears to take a pragmatic view of scientific knowledge. Such a standpoint however should not obscure historical perspective; in the "age of enlightenment" the purely hypothetical nature of scientific theory was more obvious than it is to-day, and the unfortunate solidification of hypothesis into scientific "orthodoxy" had not yet occurred.

By far the most satisfactory portions of this book are those portraying the personal views that Jefferson held. The more general parts dealing with the development of scientific thought during the eighteenth and nineteenth centuries are less adequate. The extreme complexity of the problems of the theory of vitalism, of the four elements of Aristotle, and the details of the early ideas on plant physiology, forbids a cursory treatment. Some readers will also find difficulty in appreciating the introductory calculations of Jefferson's eminence based on the number and length of articles devoted to him in biographical literature.

These criticisms aside, the author and publishers are to be complimented on the production of a readable and particularly well-illustrated monograph. Further work along similar lines should do much to make the history of science worthy of its object.

FRÖIER, K. 633–1.524(48.5)
Näringsrika vilda växter. (**Nutritious wild plants**).
Lantbruksförbundets tidskriftsaktiebolag, Stockholm 1942 : 50 öre. Pp. 32. 32 figs.

A number of wild plants have aroused interest in Sweden during the present war on account of their nutrition value, palatability, vitamin content or merely as a means of widening the range of daily fare. The present small booklet, compiled at the instigation of Professor A. Akerman, chief of the production section of the Nutritional Commission, provides a survey of the most important of these plants. Indications are given of the appearance of each plant, of its habitat and modes of utilization. Spices and medicinal plants have not been included. The first group described consists of plants capable of furnishing flour; these include the lichen *Cetraria islandica* L., plants such as *Agropyron repens*, *Taraxacum officinalis*, *Calla palustris*, two species of *Urtica*, the berries of *Sorbus intermedia* and *S. aucuparia* and the fruits of oak and beech. Various plants are recommended for salads and soups and for use in place of spinach and asparagus, others for jam and syrup and a last group is described as providing alternative sources of sugar and substitutes for coffee and tea.

DRIVER, C. M. and
HAWKES, J. G. 633.491:581.143.26.035.1
Photoperiodism in the potato.
Imperial Bureau of Plant Breeding and Genetics, Cambridge 1943 : 2s. 6d. Pp. 36. 3 figs. 3 tables.

Part I of this bulletin deals with the effect of the duration of the light period upon the growth and development of the potato plant. A section gives the experimental methods of a number of investigators since Garner and Allard's experiments in 1920, and later sections discuss the effect of long or short daylight periods upon vegetative growth, flowering and seed production,

stolon and tuber formation and maturity. Evidence is presented of the inheritance of the photoperiodic reaction and its physiological nature is discussed. A section deals with the modifying action of temperature upon the photoperiodic response, and another summarizes the reaction of the South American species and varieties.
Part II deals with the reaction to long and short days at Cambridge of a number of lines from the Empire Potato Collection. Some 75 clones from 8 species were tested and assessed on tuber weight, tuber number, stolon production, time of maturity, height of plants and flowering.

FOURMENT and ROQUES. 633.8(65)
Répertoire des plantes médicinales et aromatiques d'Algérie. (**List of the medicinal and aromatic plants of Algeria**).
Bull. Agric., Algérie 1942 : No. 61 : Pp. 159.

This popular guide is intended especially for commercial growers and collectors of plants with aromatic or medicinal uses which may prove of great value in the present shortage of drugs. Each plant is briefly described and in many cases illustrated; the right time of harvesting is indicated and the uses mentioned. R. M. I.

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